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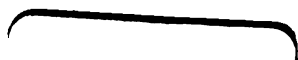
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HEARINGS

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BEFORE THE

U. S. Congress, House,

SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,

HOUSE OF REPRESENTATIVES,

CONSISTING OF

MESSRS. LITTAUER, MARSH, WALTER I. SMITH,  
TAYLOR, AND BRUNDIDGE,

IN CHARGE OF

THE FORTIFICATION APPROPRIATION BILL. 21972



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## FORTIFICATION APPROPRIATION BILL.

HEARINGS CONDUCTED BY THE SUBCOMMITTEE, MESSRS. LITTAUER (CHAIRMAN), MARSH, WALTER I. SMITH, TAYLOR, AND BRUNDIDGE, OF THE COMMITTEE ON APPROPRIATIONS, HOUSE OF REPRESENTATIVES, IN CHARGE OF THE FORTIFICATION APPROPRIATION BILL.

WEDNESDAY, *December 14, 1904.*

There appeared before the subcommittee Brig. Gen. Alexander Mackenzie, Chief of Engineers, U. S. Army, accompanied by Maj. Frederic V. Abbot, assistant to the Chief of Engineers, U. S. Army; also Brig. Gen. William Crozier, Chief of Ordnance, U. S. Army, accompanied by Capt. T. L. Ames and Capt. T. C. Dickson, assistants to the Chief of Ordnance, U. S. Army.

### ENGINEER DEPARTMENT.

**STATEMENTS OF BRIG. GEN. ALEXANDER MACKENZIE, CHIEF OF ENGINEERS, U. S. ARMY, AND MAJ. FREDERIC V. ABBOT, ASSISTANT TO THE CHIEF OF ENGINEERS, U. S. ARMY.**

Mr. LITTAUER. General Mackenzie, if you will turn to the bill here you will observe that the appropriations for fortifications—notice the language at the bottom of page 1—are made available from the time the fortification act becomes law and continue available until expended.

General MACKENZIE. Yes, sir.

Mr. LITTAUER. Now, can you give us some idea of how much of the appropriation made for the work that comes under your Engineer Department is still available? By that I mean that which is not pledged, because whenever an amount is pledged I take it for granted it is out of your hands and already contracted for.

Major ABBOT. Yes. When funds are allotted for the construction of a particular battery I shall consider them "pledged." Of unallotted sums there is practically nothing left. We have about \$7,000 of the preservation and repair fund. We have not enough gun and mortar battery funds to entirely finish all the batteries that are not completed yet, because some in Boston Harbor and elsewhere have cost a little more than the local officers estimated, and the balance is held till the very best distribution to nearly finish all can be determined. All the other appropriations are practically exhausted or pledged.

Mr. LITTAUER. Major, you are now speaking of the balance available and unallotted as of what date?

Major ABBOT. As of the present day.

Mr. LITTAUER. Now, in looking over the report of the Secretary of War, under date June 30, 1904, there seem to be in many of those items large sums; large balances, at any rate. For instance, for preservation and repair of fortifications you had \$414,631.41 unexpended on June 30 last?

Major ABBOT. If I understand what the figures in the table mean, it is a mistake, unquestionably, for the funds were allotted.

Mr. MARSH. Yes, that is a mistake, unquestionably.

Major ABBOT. We have only \$7,000 on hand at the present time of that fund available for allotment, and there is no district officer who has more than a small amount on his hands for any one of the very numerous items provided for under this appropriation. The whole appropriation for the fiscal year 1904 was only \$300,000.

Mr. LITTAUER. True; but you know these sums are available until expended. Was there not a balance left over?

General MACKENZIE. It was entirely allotted.

Mr. LITTAUER. Kindly look over that statement and give us some explanation of it if you can.

Major ABBOT. Last year the appropriation was made in April, so that we had a large balance on the following 30th of June.

Mr. LITTAUER. Yes; but that is the balance on hand on the 30th of last June—June 30, 1904.

Major ABBOT. There is an error, beyond any question, if that refers to funds unallotted or "pledged."

Mr. LITTAUER. This table on page 211 of the report of the Secretary of War for 1904 is a table which purports to state the balances on hand and available for expenditure from June 30, 1904, which of course is five months ago. The striking part of the statement is that our appropriations for the last year, as stated here, was \$7,333,748.99, and the balance still available is \$16,960,915.53; that is, it was on July 1, 1904. The large items do not concern the Engineer Department, but there are a number of them there that do concern it.

Major ABBOT. As to that \$212,000 stated to have been all that was drawn out for preservation and repair during the fiscal year 1904, I only wish it was so, because we have practically nothing left anywhere in the United States that I can now allot for preservation and repair work.

Mr. LITTAUER. Surely here is an item which you ought to be able to trace—sites for fortifications and seacoast defenses. There seems to be a balance there of \$422,288.59.

Major ABBOT. That is because we have land under process of condemnation. You can not tell exactly what the price is going to be, but it will perhaps more than exhaust that balance.

Mr. LITTAUER. We have been appropriating to you for that purpose only about \$100,000 a year.

Major ABBOT. Two hundred thousand, I think, has been the more usual figure.

M. BRUNDIDGE. You appropriated for last year, 1904, \$100,000.

Mr. LITTAUER. Yes; \$100,000 last year and \$200,000 the year before.

Major ABBOT. We have in process of condemnation one piece of *land now estimated* to cost \$250,000. It takes about four years when

you get involved in condemnation proceedings to settle the matter and find out what the actual liabilities are. Of course the funds are now in the Treasury, but it is necessary to have them in the Treasury before it is proper for the Engineer Department to commit the Government to any expenditures. For instance, if we estimate that the cost of a piece of land is \$250,000, it would be a wrong procedure for us with no funds in the Treasury to institute proceedings to condemn that land.

Mr. LITTAUER. Let us turn to another item. I believe you provide the searchlights for the defense of our most important harbors. I notice there is a balance of \$243,451.34 set down as on hand under that item on June 30, 1904. The appropriation for the year then ensuing, the fiscal year 1905, was but \$150,000. Does that account for it?

Major ABBOT. I do not understand how this table is made up. The money was allotted to disbursing officers before that time.

General MACKENZIE. This has nothing to do with the allotment.

Mr. LITTAUER. It is essential for us to know, when we make an appropriation, how much is available on the former appropriation.

Major ABBOT. A monthly report from our officers shows what balances there are on hand, and now there are very small sums for the searchlight work in anybody's hands.

Mr. LITTAUER. Then, in effect, you are not in a position to give us an explanation regarding that table?

Major ABBOT. Not regarding that table; no, sir. I know we have very little actual money left.

General MACKENZIE. I will furnish a definite statement, Mr. Littauer.

Mr. LITTAUER. Yes; send us a letter, and let it cover a general statement in explanation of how it is made up and in what way it is so different from the statement in your report about the condition of the general appropriation under the operations then in progress. In each of your annual reports you include a statement that I have never been able to make agree with this statement from the Secretary of War.

Major ABBOT. They do not agree with our balances.

General MACKENZIE. I know how this statement is made up, and while I have not gone into this particular subject I will connect it with ours and give you a full statement. This Treasury statement is made up from the requisitions drawn at the time the money comes out of the Treasury. It is charged up as of that date.

#### CONSTRUCTION OF GUN AND MORTAR BATTERIES.

Mr. LITTAUER. Now, General Mackenzie, the first item that is usual in fortification bills is the item for construction of gun and mortar batteries. You will find that item on page 2 of our bill. The note, there, states that your estimate for what you believe to be a proper expenditure during the year we are going to appropriate for here would be \$4,000,000. The Secretary of War eliminated the amount altogether, and I take it for granted that it was based upon the view that the construction of gun and mortar batteries in our coast defenses has now reached a point where our harbors are pretty effectively fortified against attack, so far as great guns were being considered, and that it was time now to call a halt on the development of the old Endicott Board scheme, and to permit other branches of the fortifica-

tion work to be treated and brought up to what might be called up-to-dateness.

General MACKENZIE. That, in general effect, Mr. Littauer, is true. A certain total was considered as the amount the War Department would suggest and recommend, and we were called upon to suggest those items which could, perhaps, be best omitted. While we felt that it was well that new work should go on, yet we still thought that if only a certain amount of money was available it would be more important to bring up the old works and add the fire control and all that matter than to go on with absolutely new work.

Mr. TAYLOR. Do you mean, General, that the leaving out or reduction of this item at this time is simply temporary?

General MACKENZIE. Yes, sir.

Mr. LITTAUER. We have understood in the past that the general scheme would entail a cost for engineering work and emplacements of about \$50,000,000.

General MACKENZIE. Yes.

Mr. LITTAUER. And that you had expended in the neighborhood of \$25,000,000 or \$30,000,000 of that.

General MACKENZIE. Yes.

Mr. LITTAUER. And having expended three-fifths of the entire amount which the scheme is to cost you have reached the point where those in charge of the determination and progress of this work have come to the conclusion that our harbors are now well fortified and that further emplacements should for the time being cease. Is that what we should understand to be the Department's conclusion?

General MACKENZIE. I do not think the idea that the work should cease is correct. I do think, if there is only a certain amount available, that new work may be suspended for a little while.

Mr. TAYLOR. You prefer the word "suspend" to the word "cease?"

General MACKENZIE. Yes; because we can not yet say the work is completed, and it should not cease until it is completed.

Mr. MARSH. You mean if there is a curtailment it could go better to that point than to the others?

General MACKENZIE. Yes, at this time.

Mr. LITTAUER. I learn from the report of the Secretary of War for 1904 that of the heaviest guns, the 8, 10, 12, and 16-inch guns, 334 out of the 364 designated to be emplaced under the general fortification plans are already provided for.

General MACKENZIE. Yes.

Mr. LITTAUER. And that 376 out of the 524 mortars have their emplacements provided for, and that 587 out of the 1,296 rapid-fire guns are provided for?

General MACKENZIE. Yes.

Mr. LITTAUER. Now, of course, the proportion of rapid-fire guns is far behind the proportion of heavy guns in point of installation.

General MACKENZIE. Yes.

Mr. LITTAUER. Is the cost of the installation or emplacement of the rapid-fire guns as great as the cost of the installation or emplacement of the heavy guns?

Major ABBOT. For the last four years we have practically put in none of the heavy guns, and have been emplacing almost entirely 6-inch and 3-inch guns.

Mr. LITTAUER. Are those costly emplacements?

Major ABBOT. The 6-inch gun emplacements cost between \$30,000 and \$35,000 apiece and the 3-inch gun emplacements between \$7,000 and \$12,000, depending upon the site and the character of the foundations.

Mr. LITTAUER. Is the 6-inch gun placed on a disappearing carriage?

Major ABBOT. Yes.

Mr. LITTAUER. And how about the 3-inch guns?

Major ABBOT. On a pedestal mount with a shield. We are still very weak in the rapid-fire element of the defense in many places.

Mr. TAYLOR. It is for the purpose of catching up with that that you suggest these appropriations?

Major ABBOT. Yes, sir.

General MACKENZIE. Of course that all comes out of an appropriation for new work. That is new work.

Mr. MARSH. The continued emplacement of these 6-inch rapid-fire guns is not new work, but continuing.

General MACKENZIE. No; that is new work. That will not go on, of course, unless an appropriation is made at this session.

Major ABBOT. That will stop. We can not emplace any more of those 6-inch guns until there is another appropriation.

Mr. MARSH. You say the fortifications are now short of these 6-inch guns?

Major ABBOT. Yes.

Mr. LITTAUER. Of the 6-inch guns, rapid-fire guns, 185 have been installed and 402 additional have been appropriated for but are not yet fully installed?

Major ABBOT. The Ordnance Department has not given us the guns.

Mr. LITTAUER. Then your work is finished, so far as these 402 guns are concerned?

Major ABBOT. There are two batteries of 6-inch guns on the Penobscot River that have been delayed, awaiting the acquisition of a piece of land.

Mr. LITTAUER. Outside of that large item, the emplacement of 402 guns, or more than twice as many as are now in effective position, what yet remains to be done?

Major ABBOT. We are all ready with the emplacements to receive the guns as soon as they are issued by the Ordnance Department.

#### MODERNIZING OLDER EMPLACEMENTS.

Mr. LITTAUER. Let us proceed to the next item—for modernizing older emplacements, \$600,000. This matter of the construction of gun and mortar batteries has been going on since 1890, and for the first time you have estimated for modernizing these old emplacements. Will you please explain to us in what way they need modernizing? What developments have been made which show the need of modernizing?

Major ABBOT. The original requirements of the service of heavy guns were supposed to be a capacity to be fired once in eight minutes to possibly once in five minutes. The idea in those days was that they would be opposed largely by other heavy guns, in comparatively small number, from heavily ironclad ships. With the development of the modern naval vessel, however, with an immense supply of rapid-fire guns, it has become necessary to increase very much the rapid fire of our land

guns and to add to the batteries a great many accessories to permit their attacking a vessel before the latter can get within range with their own overwhelming rapid-fire armament. With that in view, this new system of fire control has been developed, and all these appurtenances, in the way of telephone booths and telautograph booths and electrical communication and transportation of ammunition throughout our batteries have become essential. It is now possible to fire these guns every minute instead of once in five or eight minutes.

In the same way the ammunition service, which was entirely capable of serving the guns properly in the early stages, is now insufficient to provide the cannoners and gunners with shots as fast as the carriages are capable of being served. The carriages are now improved by the Ordnance Department, and we have to expend considerable money to correspondingly improve our facilities in all the older emplacements, which suited the conditions of the seacoast defense at the time they were built.

Our later emplacements have all the conveniences to permit this very rapid rate of firing to go on continuously. In the early ones the only possible way to maintain high speed is to prepare beforehand and to have a great deal of the cartridges and projectiles piled up around the gun, on the loading platform, where they would of course be liable to explode in case any of the enemy's shots hit them. When you take the great number of guns which have been emplaced and bring the older ones up to date, it shows that the actual per capita expenditure on the older gun emplacements is comparatively small.

MR. LITTAUER. It is stated in the report of the Secretary of War, on page 11, that the average cost of the desired improvement is estimated to be about \$725 per emplacement. Does not that give us a wrong impression, because the emplacements started in the later years are as complete as you would like to have them?

Major ABBOT. The extreme latest ones—

MR. LITTAUER. You ask for \$600,000, and that amount has been reduced from \$942,500? That was designed to take care not only of all the batteries already installed, but those that are already appropriated for and not installed. In other words, I infer that the amount of \$942,000 is for 1,297 emplacements, and of the 1,297 emplacements, only 847 are installed, and 750 appropriated for and not yet completed.

Major ABBOT. At the present time, I say, we have hardly any incomplete emplacements in the United States, or anywhere, except in the Philippine Islands. There are three uncompleted emplacements on the Penobscot River. Those are about the only ones not finished, for all intents and purposes.

MR. LITTAUER. This \$600,000 would bring up to the complete requirements all the emplacements now provided for?

Major ABBOT. Yes; the \$942,000 we estimated on would.

MR. LITTAUER. Your argument is on the basis of the necessity of more room for working and more ease in working, and for a larger powder supply?

Major ABBOT. Not a larger powder supply, but larger means of getting these projectiles and powder cartridges from the lower to the higher level. The old-fashioned method was to put them on a crane and lift them by hand power with differential pulleys.

MR. LITTAUER. How do you do it now?

Major ABBOT. They go on an electrically operated and continuously running chain hoist, which will deliver at the rate of one every twenty-five seconds. That involves the introduction of electrical power to make it possible to handle these heavy weights at such a great rate of speed. With projectiles weighing 800 or 1,000 pounds it is impossible, with the amount of artillery labor that you can get, to deliver one of those shots every forty-five seconds for a considerable length of time, at which rate they can fire the guns.

Mr. LITTAUER. Can you carry on all this work at one time?

Major ABBOT. Yes; without any question.

Mr. LITTAUER. Gentlemen, are there any further questions on that item?

#### INSTALLATION OF RANGE FINDERS.

If not, the next item of the bill takes us to a very interesting chapter of this work, the question of installation of range and position finders. You do all the constructing of towers and booths and ducts in connection with our system of fire control, do you not?

Major ABBOT. Yes, sir.

Mr. LITTAUER. This system was changed two years ago?

Major ABBOT. About two years ago.

Mr. LITTAUER. Or less than two years ago?

Major ABBOT. Yes.

Mr. LITTAUER. We gave you an appropriation the past year of \$225,000, which was 90 per cent of your estimate.

Major ABBOT. Yes, sir.

Mr. LITTAUER. Now, what have you done with it? You stated to us last year you could expend economically only \$250,000.

Major ABBOT. We have applied that very largely to giving at each of the harbors in the United States one halfway completed installation of a single fire command. At each fort there is one or two or more fire commanders. For example, at Fort Wadsworth, N. Y., there are two fire commanders. In that case, under the last act, we would try to complete as nearly as possible the fire apparatus, the houses, the towers, etc., for one fire command, leaving the other to be taken up later, the idea being to provide the artillery in each harbor with one locality at which they could drill their troops in the complete system of fire control that they have adopted. This final design as to what they wanted done was not put into our hands early enough after the last appropriation was made to enable us to carry out that idea completely.

Mr. LITTAUER. When you say completely, do you mean you could not make a beginning?

Major ABBOT. I mean that we had expended a considerable part of the appropriation before they said what they wanted us to do with it in supplying these telephone booths and conduits in the emplacements, which would be absolutely essential under any system of fire control. Therefore, while waiting for artillery decisions as to range-finder sites, we applied our funds to work which we knew would be needed sooner or later for range-finder work.

Mr. LITTAUER. Now, in connection with this work, we made a rather large appropriation for the first time last year for the electrical work, connecting with it through the Chief Signal Officer. Were you able to establish any of the newly developed systems of control?



Major ABBOT. We have at Fort Totten, at the eastern entrance to New York Harbor, a very nearly complete installation of the Engineer, Signal Corps, and Ordnance Department outfits. Over at Fort Schuyler, on the opposite side of the river, we have the engineer work very nearly completed, but we had not funds enough to install the signal corps and the ordnance material which we understand are on hand, and which would be given us if we had more funds.

Mr. LITTAUER. It takes the three departments to carry out this work?

Major ABBOT. Yes; it takes the three departments to do it, and we have endeavored whenever we started work anywhere to notify the other departments what we have funds enough to do, and they supposedly provide the materials for that particular locality. When we get to work there we notify them again, so that the Signal Corps shall have its cable on the ground in time for us to put it into the trenches when they are opened.

Mr. LITTAUER. Now there are 1,297 emplacements, and I suppose fire control must be provided for practically in each one of those. You have stated to us that you have made a beginning at only two forts?

Major ABBOT. I say we have at the present time a complete installation at those two. We have the primary stations installed at one point in nearly all the fortifications in the United States. The work is in progress, and it does not take very long to complete.

Mr. LITTAUER. That is the beginning only of this new system?

Major ABBOT. Yes.

Mr. LITTAUER. Consequently the appropriation of \$225,000 made last year is but a mere drop in the bucket in proportion to the total expense that will be involved in the work before this new range-finding scheme is finally finished?

Major ABBOT. Yes. And the reason for that is this: We never like to submit to the committee figures unless we have a sound foundation on which to base them. We could not tell what the artillery system was to be at any post in the United States at the time these estimates had to be prepared.

At that time there was a board, consisting of certain artillery officers, who were to go around the United States and visit all seacoast defenses and see exactly what fire-control service was needed at each point; this, of course, the engineers could not tell. The board was to submit the reports, which were then to be forwarded by the Chief of Artillery to us; and we were to send them out to the district engineer officers to get an accurate estimate of what would be the cost.

Mr. LITTAUER. Are the determinations of the Chief of Artillery passed upon at all by the General Staff before they come to you?

Major ABBOT. I should judge not, from the papers as they reach my desk. I do not know otherwise, but I think not, sir. When the plans of the Board are sent out to the district engineer officers, they are called on to furnish a detailed estimate of the cost in each case. We had hoped to present at this session of Congress an estimate of the cost to complete the whole system up to date, but the Artillery Board did not get in their reports for more than a very few harbors before the time at which these estimates had to be prepared. They could not get a board appointed on the Pacific coast.

Mr. LITTAUER. Can you not give the committee your own personal idea of how many millions of dollars it is going to cost?

Major ABBOT. Not unless I know how many stations are to be provided, and where they are to go. One of the great elements of cost is the copper conductor, to carry electric currents from the power stations to the base ends, where the artillery report it is absolutely essential for them to have this electric light and electric power in order to operate some of their instruments, which require a high potential and a large volume of current.

The cost of copper wire increases enormously with the distance. If you go twice as far, you have a good deal more than twice the cost, because you have to carry the potential out to these farther locations; the location of these stations might make variations of three or four hundred per cent in the cost. It depends also upon what foundation we have got to put in, whether we have to buy land, how far we must carry the cables, how much underground work must be done, and how much overhead work; particularly where rights of way have to be acquired it is impossible for anybody, without knowing where these stations are to go and how many of them there are to be, to present to the Congress any estimate that would be based on anything we would be willing to logically defend. We put in this item of \$500,000 estimated, with the statement that it was only a beginning.

Mr. LITTAUER. The \$225,000 given you last year left you with less funds than were needed to balance up the appropriation given to the other two departments?

Major ABBOT. Yes; very much less.

Mr. LITTAUER. How much less? Did you have half enough or a thousandth part?

Major ABBOT. We can not tell, as we do not know how far the other departments have advanced their work.

Mr. LITTAUER. They made demands on you for more work and you did not have the money to undertake it?

Major ABBOT. Yes.

Mr. LITTAUER. This work is evidently going to be a source of very large expenditure in the future, and I for one would be glad to get some comprehensive idea of it.

Major ABBOT. By the next Congress we will have an estimate here based on actual estimates of what the artillery states to be needed at every station and on our detailed estimates of what it will cost to put it there. As long as the system remains unchanged these statements will be reliable, but if the system is changed our estimates will have to be gone over again.

Mr. LITTAUER. That is a settled system, I believe. It is the Pensacola system? I tried to make an investigation of how much had been tried there, and I understood it had been thoroughly tried and approved by the artillery and the General Staff and the Secretary of War.

Major ABBOT. Yes; but the process of invention goes on, and they have discovered a new instrument which may apparently eliminate the use of a long horizontal base. The Warner & Swazey Company are now manufacturing an instrument called a 25-foot horizontal base range finder, which the manufacturers claim will serve the purpose of the artillery and will eliminate from the Pensacola system the stations at the farther end of the base line; in case that proves as successful as the manufacturers claim—the Chief of Ordnance will know more than I do about it—then the Pensacola system might have to be changed from the foundation up.

Mr. TAYLOR. To make the change would save instead of increasing the expense?

Major ABBOT. Yes. It would save expense rather than increase it. The estimate in any case would have to be based on the assumption that no improvement would be discovered that would reduce expenses.

Mr. LITTAUER. In other words, you have to have a standard system and take into consideration the lay of the land and everything in connection with it?

Major ABBOT. Yes; and for the last twelve months only have we been able to expend money intelligently in the installation of this new system.

Mr. LITTAUER. Your old system was the depression system, was it not? That required a tower?

Major ABBOT. Yes. The first appropriation went into these depression fire-control stations on high sites. Wherever there was a hill and we could build a low shanty on it and still get the necessary height we did so. The first appropriations went into those structures. But they are much too small to accommodate the plotting rooms that are now required. We provided in the old days a room in the emplacements for the plotting. Now it is all done in the range-finder stations.

Mr. LITTAUER. Yet the old installation that you have made in connection with fire control is all used?

Major ABBOT. Yes; all excepting the high steel towers. There have not been a great many built, but those that were built have been practically thrown out.

Mr. BRUNDIDGE. Has there been no change in range and position finders?

Major ABBOT. There has been no absolutely complete fire-control system installed anywhere except at Fort Totten; but there have been sufficiently complete installations of one sort or another almost all over the United States for the artillery to conduct their target practice, and they get astonishingly good results in their shooting. When it comes to directing any particular gun upon any particular ship in a large fleet, and thus having a fire-control system in all its completeness, Fort Totten, and to a limited extent Forts Hamilton and Wadsworth, are the only ones approaching completeness.

Mr. LITTAUER. Is it not installed at Pensacola?

Major ABBOT. That is only an experimental installation, put in with funds provided by the Ordnance and Fortification Board. It consists of high, wooden structures, that will decay soon, and will not last.

#### PROCUREMENT OF LAND.

Mr. LITTAUER. Gentlemen, are there any further questions? The next item is for the procurement or reclamation of land. You ask us here for \$300,000. If we are not going to appropriate any further money, as recommended by the Secretary of War, for the construction of gun and mortar batteries, will there be any necessity during the coming year for the purchase of any further parcels of land?

Major ABBOT. None, except perhaps for range-finder stations.

Mr. SMITH. This was a continuing appropriation?

Mr. LITTAUER. All our appropriations on this bill are available until expended. Of course land has got to be condemned at times, and that takes years, and appropriations pile up awaiting the result of condemnation.

## PURCHASE AND INSTALLATION OF SEARCHLIGHTS.

Now, we come to another important item, and that is the installation of searchlights. This work of installing searchlights, I believe, has only just begun, has it not? Searchlights are installed in but very few places?

Major ABBOT. They are not completely installed anywhere except, as you may say, in New York Harbor and Portlant Harbor. In other places we have merely enough searchlights to permit the artillery to conduct their night drills, on which the Chief of Artillery lays a great deal of stress, and rightly.

Mr. LITTAUER. For night protection most harbors are without searchlight aid?

Major ABBOT. Yes. But at each harbor we have a sufficiently-powerful searchlight projector, so that by exchanging their companies they can learn to practically use it in their drills.

Mr. LITTAUER. This will mount up, also, before all searchlights are installed. If we are going along on the basis of \$160,000 a year, it will take a great many years?

Major ABBOT. Yes; it will take a great many years.

Mr. LITTAUER. You have made an estimate this year of \$200,000. Is it in your province to insist how necessary this installation is?

Major ABBOT. The Chief of Artillery can answer that question, I suppose. He is very insistent that he should have them.

## PROTECTION, PRESERVATION, AND REPAIR OF FORTIFICATIONS.

Mr. LITTAUER. Now, on this item of protection and preservation we have during the last three years appropriated \$300,000, on the basis of more emplacements needing this protection and in the belief that your work was increasing constantly.

Major ABBOT. We have only \$2,000 left now unallotted. We have allotted it out to different officers, and they have small balances; but they will probably get through all of it before June 30 next.

Mr. LITTAUER. Please explain the necessity of so large a sum.

Major ABBOT. This brings us to the question of early batteries again. In those days it was not appreciated that the condensation in magazines would be as heavy as it has actually proved to be. We find now that magazines have to be built with air spaces around them. In the old ones we gave the powder absolute protection against the enemy's shells and projectiles, but when the doors are opened for drill purposes by the artillery, moist air comes in, water condenses on the cold walls, and runs down to the floor in drops and driblets, making the magazines damp; consequently we have to go through them and put linings—nonconducting linings—of brick, etc., in the older batteries.

Mr. LITTAUER. Right there, Is most of your money expended in making dry the damp places?

Major ABBOT. Yes, sir; largely, and in repairing our machinery that breaks down. For instance, the ammunition hoists are breaking down frequently; we are expending money all the time keeping those things in order. There is an immense expense connected with maintaining a modern battery.

Mr. LITTAUER. That will increase rather than decrease as your emplacements become greater?

Major ABBOT. Yes, sir. In the present stage we can get along on \$300,000, and that is about all.

#### PLANS FOR FORTIFICATIONS.

Mr. LITTAUER. You would not need to have any appropriation for plans of fortifications if you are not going to extend these fortifications.

Major ABBOT. Probably not. That money is generally applied to the Board of Engineers in New York, which has the study of typical emplacements in its charge.

Mr. LITTAUER. You would advise the continuance of that appropriation, even if we came to the conclusion not to give anything for the general batteries?

Major ABBOT. The study should be continued whether the construction is temporarily suspended or not.

Mr. LITTAUER. Are there any further questions, gentlemen?

#### TOOLS AND ELECTRICAL APPLIANCES.

Now, then, the next item is for tools, electrical and engine supplies and appliances. You make a request for \$5,000 more than you had last year; based again on the increased number of emplacements?

Major ABBOT. Yes; and on the increased amount of machinery.

Mr. LITTAUER. This machinery is for what purpose—to keep ago-ing the machines installed in the batteries?

Major ABBOT. Yes. This appropriation supplies packing, and gauge glasses for the boilers, and the grate bars under the boilers for shaking grates, and all such materials.

Mr. LITTAUER. As your establishment becomes larger this fund must be larger?

Major ABBOT. Yes. There are a great many districts where I am now unable to issue appliances because the officers have already so nearly expended what was on hand.

Mr. LITTAUER. If I am not mistaken, in your report, General Mackenzie, you refer to some special item of Cushings Island. That has been a very interesting subject with us in years gone by. What is that special item?

General MACKENZIE. That is a special item which the Chief of Staff instructed us to submit an estimate for.

Mr. LITTAUER. It was an instruction that came to you from another branch of the service?

General MACKENZIE. Yes; it was for land, in addition to what they have now, that appeared to him desirable.

Mr. LITTAUER. What purpose was it for?

General MACKENZIE. For fortification work that may come in the future.

Mr. LITTAUER. Any particular branch of fortification work—the breaking of window glass in hotels, and so on?

General MACKENZIE. Oh, no; I do not think the Chief of Staff would recommend it for that. It was our thought that there would be a time when there would be some small point on Cushings Island that we might desire for rapid-fire batteries. It has been, of course, the other thought that there might be some additional land in the vicinity of that which we now own which would be desirable, but I

think the whole item was afterwards omitted or stricken out in the Secretary's office.

Major ABBOT. That was a separate item in the estimates, and it was omitted in the Secretary's office.

#### CONSTRUCTION OF SEA WALLS AND EMBANKMENTS.

Mr. LITTAUER. Now we come to the construction of sea walls and embankments. They are designed to protect the walls from the inroads of the water, I suppose?

Major ABBOT. Yes.

Mr. LITTAUER. You ask here for \$99,000. What do you design to do with it?

Major ABBOT. That was the appropriation of last year, and the Secretary of War reduced our estimates to that sum for the coming year.

Mr. LITTAUER. What would you do with it if you had it?

Major ABBOT. We would apply it to the worst places, where the banks are caving in the most rapidly, and where there is the most likelihood of injury to the batteries.

Mr. LITTAUER. Are there any existing batteries being rendered unsafe as liable to be washed away for the lack of these walls?

Major ABBOT. Nothing has happened recently in that way more than in the past, but at Fort Terry there is a liability of having the post cut in two. That is a narrow tongue of land which is cutting away rapidly.

Mr. LITTAUER. How much would that cost?

Major ABBOT. We could protect the dangerous portion there for a comparatively small sum of money.

Mr. LITTAUER. How much?

General MACKENZIE. Nineteen thousand four hundred dollars is estimated.

Mr. LITTAUER. Then would you consider that \$19,400 as being the most essential of any of these? Are there any other points?

Major ABBOT. In the opinion of Colonel Powell, the district engineer, Fort Terry is not the most important point. There is a battery in his district that is being almost undermined. But in my mind that particular battery is not of the first importance. At Gardiners Point it would cost about \$6,000 to protect the battery that is being undermined.

Mr. LITTAUER. Would the development of a scheme of protection there ever bring you to the point of abandoning that battery?

Major ABBOT. It is possible.

Mr. BRUNDIDGE. Do I understand that there are only two points, then?

Major ABBOT. No, sir. There is a list here in this paper, which we leave with the committee, showing what we would do with our estimates of \$300,000 for this purpose.

(The list referred to was left with the committee, being sheet M of the confidential statement.)

Mr. BRUNDIDGE. Is that for sea walls and embankments?

Major ABBOT. Yes. In many places those sea walls are called for by the Quartermaster's Department to protect their reservations. Where the encroachments of the ocean are most to be anticipated there ought to be a sea wall built so that the Quartermaster's Department buildings may be preserved from washing away in case of heavy storms.

Mr. TAYLOR. You make an estimate of what you would do if you got \$300,000?

Major ABBOT. Yes, sir; on sheet M of the statement I leave with the committee.

Mr. TAYLOR. And you also make an estimate of what you would do if you got your estimate of \$99,000?

Major ABBOT. Yes, sir.

Mr. TAYLOR. You have given us the full information as to what you will do with whatever fund is appropriated?

Major ABBOT. Yes.

#### CONSTRUCTION OF MINING CASEMATES, ETC.

Mr. LITTAUER. The next branch of our subject is the construction of mining casemates, cable galleries, torpedo storehouses, cable tanks, and other structures necessary for the operation, preservation, and care of submarine mines and their accessories, etc. Your branch of this work of course is the constructive one?

Major ABBOT. Yes.

Mr. LITTAUER. Now, a few years ago we were given the impression that although this general construction was not of an up-to-date character, not completed, nevertheless it was serviceable.

Major ABBOT. That was the engineer view.

Mr. LITTAUER. Now we are confronted, to-day, with the view of those in charge, that submarine defense with this entire outfit is utterly inadequate, and that it needs overhauling from beginning to end. We have divided the appropriation into two items for the past two years, I believe.

Major ABBOT. Yes.

Mr. LITTAUER. And this item, here, with the estimate of \$400,000 cut down from \$600,000, is your estimate to carry out what scheme?

Major ABBOT. The \$600,000 estimate originally put in was our approximate estimate of the probable cost to carry out plans that the torpedo board of artillery officers at Fort Totten laid down. They claimed, first, that the older casemates were of no use; and in the second place, they must immediately have the facilities at all points to drill their troops in the use of torpedoes.

The old engineer idea was not to have men drilled at every point, but to have the torpedo experts drill at one point with a comparatively small amount of torpedo material, and then to provide small but serviceable casemates all over the United States, from which the mines would be operated only in time of war. Inasmuch as the artillery now have the garrisons at all these posts and want to drill them, it necessitates having at every one of these localities as complete an outfit for drill purposes as under the old engineer scheme was provided at Willets Point, the headquarters, which place was made a complete school of instruction in practical torpedo laying, planting, operating, and taking up.

Mr. LITTAUER. The loading rooms you have been building recently serve the purposes of a school secondarily. Primarily these are established for the protection of the mine fields, are they not? Is there any plan to fit them up as a school of instruction?

Major ABBOT. Oh, yes; but in time of war we had not proposed to use any such building. When we actually had the torpedoes we did

the loading generally under canvas, on the theory that in case of an explosion there would be less injury than would be produced by the flying fragments of a building. The artillery desire a building now of considerable size, equipped with traveling cranes and appliances, making it suitable for drilling men, and warmed in the winter time so that the men can continue the drills.

Mr. LITTAUER. Has our experience in the Spanish war shown that there was need of such precautions and drilling?

Major ABBOT. We had no accident in the loading. After we put them down and were taking them up again we had some accidents in removing the dynamite from the interior of the cases. We had some men killed during that process, but in the act of laying I do not think a single accident occurred except that Captain Harts was hurt by a premature explosion.

#### SUBMARINE MINES, ETC.

Mr. LITTAUER. I find in the report of the Torpedo Board that they make an estimate of what I would call the rebuilding of all the engineering works in connection with the submarine defenses, at a total cost, if I remember aright, of \$3,800,000. Five thousand one hundred and thirty-nine officers and men is the estimate of the personnel required—169 officers and 4,970 men. This, they say, will probably cost, in round numbers, \$5,000,000 in addition, making about \$9,000,000 as the estimated first cost of protecting the submarine coast defense, building material, and personnel. That would come under your branch?

Major ABBOT. No, sir. The equipment would come under the Ordnance Department.

Mr. LITTAUER. It says cable, explosives, instruments, etc. Have you [addressing General Crozier] any facts that would explain that matter?

General CROZIER. I would say that mine cases form a considerable portion of this material—the cases themselves.

Major ABBOT. There is a slight difference of opinion just now on that point, so that it is hard to answer the question whether we can complete the engineer work for the sum stated by the torpedo board. The torpedo board think their estimates are big enough, but we have grave doubts about that.

Mr. LITTAUER. You do not think those large figures are large enough? And you think the amount you ask for here is a very modest sum?

Major ABBOT. Yes. The engineer part is comparatively small in that large aggregate.

Mr. LITTAUER. When you say that you mean \$600,000, do you?

Major ABBOT. Yes; that sum submitted agrees pretty closely with the table prepared by the Torpedo Board. But it is on the question as to what we shall do and how we shall build the structures that the matter of cost comes in very largely. We could build something for that sum, but whether it will be what they want us to build is another question.

Mr. LITTAUER. Gentlemen, are there any further questions? This is one of the large items.



## (1) FORTIFICATIONS IN INSULAR POSSESSIONS.

If there are no further questions we will go on to others in connection with the fortification of insular possessions. Those are on page 6. How much of the general project for the fortification of the insular possessions has been determined upon so far, or what kind of projects have you made?

Major ABBOT. Merely preliminary general projects, though in considerable detail.

Mr. LITTAUER. No complete scheme has been determined on?

Major ABBOT. No. A question was put before Congress two or three times in annual reports by the engineers as to the advisability of the creation of a new board like the Endicott Board, but no action was taken thereon. We have such projects now fairly well determined at Manila, on Subic Bay, on the island of Guam, at Pearl Harbor, at Honolulu, and at San Juan, P. R.

Mr. LITTAUER. Last year we gave you \$700,000 to begin this work?

Major ABBOT. Yes.

Mr. LITTAUER. Where did you expend it?

Major ABBOT. On the advice of the joint Army and Navy board that entire sum was expended in the Philippine Islands, of which about two-thirds was put in Subic Bay, and the balance at Manila Bay.

Mr. LITTAUER. You have not yet started on the fortifications of the Hawaiian Islands?

Major ABBOT. Not except the investments in land.

Mr. LITTAUER. You come now with an estimate of \$1,400,000 for gun and mortar batteries in the insular possessions. That is the largest item in this bill. What is the basis for that?

Major ABBOT. It is based on quite accurate surveys of the fortification sites around Manila Bay and Subic Bay.

Mr. LITTAUER. This would not go beyond Manila and Subic Bay, even with this amount?

Major ABBOT. With \$1,400,000 we would also take up Guantanamo, Cuba, at the urgent request of the Navy Department. At Guantanamo we have no finished project, but the matter is now before a board of engineers, who are considering maps and making estimates.

Mr. LITTAUER. Approximately how much of this estimate of \$1,400,000 would go to Guantanamo?

General MACKENZIE. One hundred and eighty thousand dollars.

Mr. LITTAUER. And the rest to Manila and Subic Bay?

Major ABBOT. Yes; of which \$1,035,000 would be for Manila and \$185,000 for Subic Bay.

Mr. LITTAUER. Is there any other provision made for seacoast fortifications at Subic Bay except the provision made in this bill?

Major ABBOT. No, sir.

Mr. MARSH. What is that carried in the naval appropriation bill?

Major ABBOT. That provides for the installation of a large naval station at Olongapo, and those are the defenses to protect Olongapo.

Mr. LITTAUER. Olongapo is in Subic Bay?

Major ABBOT. Yes.

## SITES IN HAWAIIAN ISLANDS.

Mr. LITTAUER. Now we come to the item for the procurement of land needed as sites for the defenses of the Hawaiian Islands. Last

year you estimated for \$526,100 to buy as much land as you deemed necessary for the complete protection of the harbor. We appropriated \$200,000, and you ask again for \$200,000 more. What have you done with the \$200,000 we have given?

Major ABBOT. That has been all pledged, you might say, for the purchase of sites—about 320 acres at Pearl Harbor, part of the site for the battery at Waikiki Beach, Honolulu, and at Diamond Head. We have practically all the land we need at the latter point; but there are portions—as, for example, the Waikiki Beach property—which are very costly.

Mr. MARSH. That is in Pearl Harbor?

Mr. ABBOT. That is Honolulu. We have not the funds at the present time to complete the purchase of that site, and there are other sites in the Pearl Harbor neighborhood that have not been acquired at all. We have agreed quite amicably on favorable terms at some places, and in other places we could not get clear title. In one or two instances we had to condemn. The relative prices paid for the several parcels are almost exactly in accord with the original estimates, and we believe we can get all that land for just about the estimated cost. At one mortar-battery station a man undertook to hold us up for an outrageous price, but by a little investigation we got another site in the close vicinity, and we managed to get it for a fraction of what that man wished to sell for.

Mr. LITTAUER. How close was it to the estimate of the Army board, or of the joint Army and Navy board?

Major ABBOT. Oh, very close to it.

General MACKENZIE. I think in almost all these cases we get the lands at less than their assessed valuation there.

#### FORTIFICATIONS IN THE PHILIPPINE ISLANDS.

Mr. MARSH. How much money has been expended for the fortification of Subic Bay?

Major ABBOT. That is one of those places where funds have been allotted, but not yet expended.

Mr. MARSH. Has any work been done?

Major ABBOT. Yes; we expended about \$25,000 out of the \$485,000 that has been actually allotted. A plant has been ordered in San Francisco, the timber has been ordered, surveys for the site of the batteries have been completed, and they are beginning now on the excavations.

Mr. MARSH. What have they done at Manila Bay in that direction?

Major ABBOT. There we expended more out of the lump sum we had. The plant we have almost completely purchased, but not paid for, in San Francisco, where we have to get most Philippine supplies.

Mr. MARSH. I mean at Manila Bay.

Major ABBOT. Yes; that is, at Corregidor Island, Manila Bay.

Mr. MARSH. That is right at the entrance of the bay, is it not?

Major ABBOT. Yes.

Mr. MARSH. Has any work been done there?

Major ABBOT. We are laying our railroads to get supplies; also the foundations for the mortar batteries are in progress, and the wharves, which they are now beginning to work on.

Mr. MARSH. That is, the wharf on Corregidor Island?

Major ABBOT. Yes, sir.

Mr. LITTAUER. Mr. Marsh mentions this question to me: If we should give you the \$1,400,000 estimated for fortifications in the insular possessions, would you then consider the work at Manila Bay, Subic Bay, and Guantanamo completed, or only begun?

Major ABBOT. Only begun. At Subic Bay it would be nearly completed. At Manila Bay we would probably be about halfway through, although that depends upon a more accurate study of the matter by the board of engineers than we have had a chance to give it yet.

Mr. LITTAUER. How about Guantanamo?

Major ABBOT. That is only started.

Mr. LITTAUER. How much would that cost?

Major ABBOT. The board has not made its report on that yet, and we can not say.

Mr. LITTAUER. Gentlemen, that completes the engineers' items. Unless you desire to go into some further matters, we are obliged to you, gentlemen.

#### MILEAGE OF OFFICERS.

General MACKENZIE. Mr. Littauer, we have assumed that this money appropriated for fortification work was intended to cover all the expenses in connection with it. A portion of that expense, of course, not a large portion, provides for travel and inspection of the work. Under a decision of the accounting officers of the Treasury it is feared that payment from these funds will be suspended in consequence of an item in the last army bill, that provides that all mileage shall be paid from that fund in that bill. It is not supposed that it was intended to include travel in connection with fortification construction work, but under the strict ruling of the auditing officers of the Treasury it is feared this will be done.

Mr. LITTAUER. Do you ask this on account of your connection with the fortifications in the insular possessions, or in a general way?

General MACKENZIE. In a general way.

Mr. LITTAUER. I notice on page 20 of our bill there is inserted a new provision--

*Provided*, That the several amounts herein appropriated under the titles "Armament of fortifications" and "Fortifications for insular possessions" shall be applicable to the payment of mileage to officers traveling on duty in connection with the work so authorized.

Is that what you refer to now?

General MACKENZIE. Yes, that is the point. I did not know that that was in the bill.

Major ABBOT. You know, we had no copy of the bill given to us.

Mr. LITTAUER. We insert that at the end of the bill rather than at the beginning. That is necessary in order to provide properly for your part of the work that has to be conducted by your officers in setting up the emplacements and conducting your constructions?

Major ABBOT. Yes, sir.

Mr. LITTAUER. That provision meets with your approval?

Major ABBOT. That provision would cover the ordnance, but would it cover the Engineer Department? You know the armament of fortifications covers the ordnance. That might exclude the engineers.

Mr. LITTAUER. You want fortifications and other works of defense added to that, do you?

Major ABBOT. Yes, sir.

General MACKENZIE. Of course the auditing officers are very particular as to the wording of a provision. Perhaps this would be accepted by them.

Mr. LITTAUER. I rather think they would not accept this. My information would lead me to think the contrary. I think it ought to read: "The several amounts herein appropriated under the titles 'Fortifications and other works of defense,' 'Armament of fortifications,' and 'Fortifications for insular possessions.'" That would put it beyond question?

General MACKENZIE. I do not know that that wording would satisfy them.

General CROZIER. You mean the wording suggested by the chairman now?

General MACKENZIE. Yes.

Mr. LITTAUER. Would it not do to say, "That the several amounts herein appropriated under the title"—and then take in the titles under which the appropriations are made for the engineers and ordnance—"shall be applicable to the payment of mileage to officers traveling on duty in connection when so authorized?" Would not that cover it?

General CROZIER. I do not see why it would not?

General MACKENZIE. It might be applicable. But here is another appropriation in the army bill also applicable. Here is a law which states that all items of mileage shall be paid from the item in the army appropriation bill.

Mr. LITTAUER. It would be legislation, and I do not see how the Comptroller can neglect it. If you have any suggestion to make you can write us a letter. We would, of course, be glad to include in the bill any item that would cover that.

General CROZIER. You might get the Military Committee to make a change in the other bill. There is nothing you can do here, if they do something contrary in another bill, that will not lead to danger.

Mr. SMITH. Suppose the army bill passes later than this fortification bill and provides something different, would not that be considered as binding, being passed later—as the last word?

Mr. LITTAUER. General Mackenzie, will you please leave that amended language with us?

General MACKENZIE. Yes, sir; here it is:

*Provided*, That hereafter mileage to officers of the Corps of Engineers and of the Ordnance Department traveling on duty in connection with fortification and armament work shall be paid from the appropriation for the work in connection with which the travel is performed.

## ORDNANCE DEPARTMENT.

### STATEMENT OF BRIG. GEN. WILLIAM CROZIER, CHIEF OF ORD- NANCE, U. S. ARMY, ACCOMPANIED BY CAPT. T. L. AMES AND CAPT. T. C. DICKSON, ASSISTANTS TO THE CHIEF OF ORDNANCE, U. S. ARMY.

Mr. LITTAUER. General Crozier, last year we revised the items of appropriation, eliminating a great number of items usually carried in this fortification bill. How has it worked?

General CROZIER. Very well indeed; and I am asking you, this year, to carry it just a little further, to make some further consolidations—

a very insignificant number in comparison with those you made before. But they have been shown by the experience of the year to increase the convenience of administration.

Mr. LITTAUER. Our consolidations were made with a view to gathering together appropriations belonging to one subject.

General CROZIER. Yes.

PURCHASE, MANUFACTURE, AND TEST OF INSPECTING INSTRUMENTS.

Mr. LITTAUER. Now, looking through your estimates for the year, I find one that seems to be about as badly jumbled together as anything we have had in the past. On page 11 of our bill there is an item for the purchase, manufacture, and issue of inspecting instruments, etc., where you want the word "tests" inserted in lieu of the word "issue"—purchase, manufacture, and tests of inspecting instruments for the manufacture of cannon, carriages, and ammunition, etc. That is entirely, of course, in the manufacture of ordnance?

General CROZIER. Yes, sir.

Mr. LITTAUER. And the next clause in that same paragraph provides for range finders and other instruments for fire control at the fortifications. That covers two entirely different subjects; and the third clause in that item says, "and in field batteries."

General CROZIER. Yes, sir.

Mr. LITTAUER. So that there is there included in one appropriation a sum of money that could be diverted to any one of those three branches of your work.

General CROZIER. Yes; that is true.

Mr. LITTAUER. Especially at this time, when we want to take up the matter of range finding specifically, it seems to me that that is an item that ought to be recast. You seem to want depression range finders, and range finders for cavalry, and star gauges and other gauges for seacoast guns, and so on, all in one item.

General CROZIER. The reason why they are lumped together is that they belong to a general class of instruments of precision that are manufactured at some one place or are obtained from dealers in the same class of materials. However, they can be divided up and recast in the way that you mention.

Mr. LITTAUER. My attention was called to it, because I tried to figure out from the various items in the bill how much was estimated for in connection with the new range-finding system.

General CROZIER. Yes.

Mr. LITTAUER. Here is a sum amounting to \$155,000, according to your estimates, of which I could not tell whether \$5,000 or \$150,000 was for that purpose.

General CROZIER. That is because you have not the prices. I have mentioned the articles, but not the prices. That can be divided up without any inconvenience. We have never divided it up heretofore, but we can do so now.

Mr. LITTAUER. Then in your report you state:

It was hoped that the Committee on Appropriations would look favorably upon a recommendation leading to accounting for all appropriations made for a specific object at various arsenals under one heading, but this recommendation failed to meet with approval of the committee.

What does that apply to? I could not find out in this bill what that remark would apply to.

General CROZIER. It has special reference to certain items that were carried in the sundry civil bill. We did make some appropriations for arsenals in this bill, and it would be a convenience in keeping our accounts if we could have a heading for each arsenal and have this appropriation disbursed under the heading of, say, Watertown or Watervliet arsenal. That is done in this bill, but it is not done in the sundry civil bill.

Mr. LITTAUER. I beg pardon, then. I thought it referred to this bill.

#### ARMAMENT OF FORTIFICATIONS.

Now, as to the item on page 7 of the bill before you, I notice in the Annual Report of the Secretary of War for 1904, under the heading of armament of fortifications, page 211, there was a balance on the 30th of June, 1904, of \$8,620,285.05. What does that mean? Then under the head of gun and mortar batteries there seems to have been a balance of \$2,865,482.50. Those are enormous items.

General CROZIER. Yes; they are very large. Of course, a large part of our work requires a long time for completion, even after contracts are made. Those are the sums which are not drawn out from the Treasury. Of course, the Treasury officials desire that we shall not draw these sums out until about the time they are required for disbursement. Therefore we leave them there until the time comes when they have to be paid out.

Mr. LITTAUER. That is your Treasury balance, against which you have made allotments during one, or two, or three, or four years past?

General CROZIER. Yes, sir.

Mr. LITTAUER. I notice, for instance, there were only 185 rapid-fire guns installed, while 402 rapid-fire guns are appropriated for in addition.

General CROZIER. Those appropriations have mostly been made in recent years.

Mr. LITTAUER. Would the cost of them be included in that \$8,000,000?

General CROZIER. Yes, sir. They have not yet been completed and have not yet been paid for. They are under construction. Those rapid-fire guns, except the larger sizes, are under construction by contract, and the payments on them have not become due.

#### GUN AND MORTAR BATTERIES.

Mr. LITTAUER. According to our repara-graphing of the bill the gun and mortar batteries are eliminated. Does that mean for the construction of gun and mortar batteries?

General CROZIER. Yes, sir; that is an engineer item.

Mr. LITTAUER. It makes it very difficult for me to understand it, because the engineer stated to me a few moments ago that they had practically nothing left.

General CROZIER. They mean by that that they have nothing left which is unmortgaged.

Mr. LITTAUER. How can you mortgage a sum of money for the emplacements?

General CROZIER. You can make a contract for it, an allotment to precede the construction at such and such places; and the money is allotted for it, and then it is no longer available for carrying out any other plan.

Mr. LITTAUER. This balance amounts to nearly two years' appropriations under that heading?

General CROZIER. Yes.

Mr. LITTAUER. Let us proceed, then, to our items.

General CROZIER. It causes us a great deal of work—of course you understand, Mr. Chairman—to expend these appropriations after we get them. We can not always do it as quickly as we would like.

PURCHASE, MANUFACTURE, AND TEST OF MACHINE AND AUTOMATIC GUNS.

Mr. LITTAUER. On page 7 your first item is for the purchase, manufacture, test, and issue of machine and automatic guns, including their carriages, etc.—25 automatic machine guns.

General CROZIER. Yes.

Mr. LITTAUER. These are guns of the smaller caliber?

General CROZIER. Yes; of the smallest caliber.

Mr. LITTAUER. They are not largely to protect the mine fields?

General CROZIER. We use a larger size to protect mine fields. We use these guns against troops, against landing parties—against parties trying to take the fortifications in reverse.

Mr. LITTAUER. Are they a part of this Endicott scheme? Are they included in the general scheme for fortifications?

General CROZIER. I think so. I do not remember the specific items. I would have to consult that scheme to find out whether they are mentioned or not, but they have always been considered a necessary part. I will add, however, that these guns are used not only for fortifications, but for the army in the field, although they are in the Fortification bill. Logically this appropriation would seem to belong to the Military Committee, but it has always been in this bill.

Mr. LITTAUER. This committee handles appropriations for field artillery?

General CROZIER. Yes; the major part of these guns are intended for field artillery. I will give you the exact figures. Ultimately we consider that 935 of these guns will be needed. Of that number, 200 only will be for the fortifications, and the remainder will be for the use of troops in the field.

Mr. LITTAUER. How many have you of them now?

General CROZIER. We have now provided for 150. That is, 150 of the new model, and we have on hand of older models 297.

Mr. LITTAUER. Is this an item that you would insist upon strongly? Do you think the necessity is a proper and a great one at this time, when we are trying to cut down appropriations?

General CROZIER. I think so. It has been very much cut down as it is.

Mr. LITTAUER. We gave you a very large amount last year, three or four times what we have usually given you.

General CROZIER. You gave me last year \$210,000, and this is only one-third of that.

Mr. LITTAUER. The last year's appropriation was three times the appropriation of the year before, and four times that of the year before that.

General CROZIER. That is true.

Mr. LITTAUER. Is this a new model just adopted?

General CROZIER. Yes, sir; just adopted. Let me tell you the plan. I am providing for one of these guns for each battalion of infantry and each squadron of cavalry. That will require for the Regular Army 135.

Mr. SMITH. General, take this particular type of gun that we are now considering, this automatic machine gun of caliber .30; could not that be bought in case of need, in an emergency?

General CROZIER. Nobody keeps them in stock. They have to be manufactured under orders. We contemplate getting them entirely from private manufacturers, not manufacturing them in our own arsenals. It requires a long time to increase any given facilities for manufacture; that is, if an establishment is equipped for turning them out at the rate, say, of a hundred guns a year, it takes it a long time, a year or more, to prepare itself to turn out 200 a year; so that it is difficult to increase the rate of supply suddenly, upon occasion.

Now, if you will permit me, I will continue my answer to the Chairman's last question.

Mr. SMITH. Certainly.

General CROZIER. As to the number of these that will be ultimately needed, I mentioned one for each battalion of infantry and each squadron of cavalry. That would require for the Regular Army, as I said, 135 guns. Then I contemplate having 600 guns in reserve. That would provide for 600 battalions or squadrons of volunteer troops that you would need in time of war.

Mr. MARSH. Five times the number of the Regular Army?

General CROZIER. A little over four times—between four and five times that much—yes. That would mean 200 regiments, or, approximately 250,000 men, which would be an army of very moderate size, as you will see; and in addition to those, there are estimated to be required for the seacoast fortifications, 200. That makes up the 935 which we would expect ultimately to get.

Mr. LITTAUER. Last year you estimated for \$1,407,000. Was that with the hope of providing for all of those?

General CROZIER. Not at once. It was with a view of making some progress in providing this number which I have mentioned.

Mr. LITTAUER. This will be, then, an annual estimate on your part right along?

General CROZIER. It will be increased, Mr. Chairman. This year I have cut it down because the status of the manufacture of these guns is not very satisfactory. Something over a year ago the present model was adopted. It is an English gun. In a competition the English gun won out as being the best. I have had considerable difficulty in having the gun manufactured, so that the few that we could get abroad in the beginning would thereafter be interchangeable with the main supply that we intend to get in this country, and for the manufacture of which, under my suggestion, arrangements have been made by an American establishment. That difficulty has kept back the manufacture of these guns, so that we will not be able to expend during the next year, or until I have time to come and present the matter to you again, a larger sum than I estimate here. That is the reason why it is now as small as it is.



Mr. LITTAUER. You would estimate this for American manufacture, or would you continue the purchases in England?

General CROZIER. These are to be of American manufacture entirely.

PURCHASE, MANUFACTURE, AND TEST OF MOUNTAIN, FIELD, AND SIEGE CANNON.

Mr. LITTAUER. The next item is "for the purchase, manufacture, and test of mountain, field, and siege cannon, including their carriages," etc., \$653,000.

General CROZIER. That is an important matter, and if you have time I would like to devote a few sentences to explaining how it stands. You will see there are three classes of mobile artillery included—first, the mountain gun, carried on pack animals; second, the field gun, which is the mainstay of the fighting army, and the accompanying vehicle, and, third, the siege gun and howitzer and mortar—siege artillery, which is also hauled by animals, but is of larger and heavier material.

Mr. LITTAUER. About where is the dividing line between what you would call field and siege guns?

General CROZIER. At the weight of about 30 pounds for the projectile. The heaviest gun that we consider a field gun fires a projectile of 30 pounds, and the lightest siege gun a projectile of 60 pounds. The caliber of the heaviest field gun is 3.8 inches and the caliber of the lightest siege gun would be 4.7 inches. We draw the line there which for the projectile is between 30 and 60 pounds.

Mr. SMITH. I would like to ask a question, if I may, right there, General. Do I understand that there are no guns with projectiles between 30 and 60 pounds?

General CROZIER. We do not contemplate any. We contemplate having the weight of the projectile doubled as we pass from gun to gun.

Mr. SMITH. I did not understand it, and I wanted to get it clear.

General CROZIER. It is thought that that will give a sufficient difference to make it worth while to have two different sizes of guns and two different classes of material, and not enough difference so that you will find yourself without the weight or caliber that you want between the two.

Now, with reference to these three classes, I am not asking you now for a sum of money for any considerable supply of siege material. The principal reason for this is that I am not yet ready with the designs, and the reason I am not ready with the designs is that I have not a sufficient force of officers to progress with them.

Mr. LITTAUER. Have we any field and siege guns of recent manufacture?

General CROZIER. We have a fairly good number of a type that is now becoming obsolete. They are still effective guns, but they are by no means as effective as those that can be built to-day, and not as effective in their class as the field guns we are now providing are in theirs. The reason is, as I say, that my designs have not progressed as they ought to have.

Mr. LITTAUER. Now as to mountain guns.

General CROZIER. The situation with them is much more encouraging. I am not asking anything for that class for the reason that I

have enough mountain guns on hand of a sufficiently recent model to be effective. I desire only to make a slight change in the mountain guns which we now have.

Mr. LITTAUER. Now the field gun. Is that a modern arm?

General CROZIER. We consider that a most important gun. I am glad to be able to say, as to that, that we are in a position of considerable advantage. We have an excellent gun, thoroughly tried, and now under manufacture in considerable numbers. I estimate that we will ultimately need of these guns 250 batteries of 4 guns each, with their accessories—vehicles and other materiel. I base that on the proportion of two guns per thousand of an army of 500,000 men. The proportion is less than has heretofore been considered proper, but I have decreased it because of the great increase in the rapidity of fire of the modern field guns, for which reason the gun is much more effective; and therefore, as an initiatory proposition, I would provide a less number. I do not think everybody would agree with me on that, and I do not consider it a settled question; but it gives us a basis, and it is on the side of moderation.

Now, with reference to these field guns, we have now provided for and under construction 52 of the 250 batteries. Of these 52 batteries, 26 have been provided for by appropriations in the army bill, for arming and equipping the militia, and 26 have been provided for by appropriations in the fortification bill. That leaves 198 batteries still remaining to be provided for, and the rate which is provided for in this bill and in the pending army bill would cause that number to be procured by the end of the fiscal year 1916.

Mr. LITTAUER. Why are they provided for in the army bill?

General CROZIER. Some few years ago there was appropriated in the army bill \$2,000,000 for providing the militia with new equipment, that sum being additional to the \$1,000,000 which is annually provided under a paragraph of the Revised Statutes. Of that \$2,000,000 I induced the Secretary of War to set aside \$700,000 for artillery. Last year there was in the army bill an appropriation of \$585,000 for field artillery for the militia, evidently made in continuation of the same policy.

Mr. LITTAUER. Do you get any other field artillery in the army bill except for the militia?

General CROZIER. None, except for the militia. And the army bill stated that it should be applied to the purpose of arming and equipping the militia. It is not applicable to any other purpose. This year, following the same idea, I have estimated for 9 batteries in the army bill for the militia. If I had not done so I should have put them in this estimate.

Now, I will add another word to that. The militia of the various States now number something over 100,000 men, and the proportion of which I have already spoken, 2 guns per thousand men, would make 200 guns, or 50 batteries of 4 guns each. Twenty-six batteries, as I have said, are already provided for. Nine additional are estimated for in the army bill, making 35. This would leave 15 more, after the provision of which, in accordance with the present scheme, that matter would end.

Mr. SMITH. Pardon my ignorance, General; but suppose in time of war the militia should be mustered into the service of the United

States; what would become of these guns? Would they be utilized by that force?

General CROZIER. Oh, yes; they would bring them with them. They remain the property of the United States.

Mr. SMITH. I understood that; but they are assigned to the use of the militia. I was inquiring whether, if any portion of the militia were to be mustered into the service of the United States, the guns would pass from that body, which would be a United States force for the time being, or would they go back under that provision in the army bill for the use of what still remained as militia?

General CROZIER. If the militia were mustered into the service of the United States as provided by law, I understand they would take their arms with them.

Mr. TAYLOR. The guns would go with the men?

Mr. LITTAUER. The same as the musket?

General CROZIER. Yes; the same as the musket. The law now provides that on occasion the militia can be summoned into the service of the United States for nine months, and the President is the sole judge of the necessity.

Mr. SMITH. On some occasions the militia are mustered into the service of the United States?

General CROZIER. Yes; if it is considered that volunteer troops are required in addition to the militia that can thus be summoned to the service of the United States, militia regiments are authorized to volunteer as complete organizations. In that case, I suppose, they would have to be armed over again by the United States or an arrangement made with the States covering the point.

Mr. SMITH. That is what I mean by my question—mustered into the service of the United States, and not simply called up as the State militia.

General CROZIER. I do not think there is anything in the law that would then call for their taking their arms with them.

Mr. SMITH. Then in time of war, if the President of the United States thought it necessary to call for volunteers, these guns now provided for in the army bill would not be available for that body of men under these conditions?

General CROZIER. They would be available only for the use of the militia, and if the troops came into the service of the United States not as militia, the guns would not be available for the use of such troops except by some kind of special arrangement.

Mr. LITTAUER. The title could not pass?

General CROZIER. No.

Mr. LITTAUER. Could not the United States withdraw these guns from the militia?

General CROZIER. After the guns should cease to be utilized for the purpose for which they were procured, namely, for arming and equipping the militia, they belong to the United States for such disposition as it sees fit to make of them, as is the case with any of its property.

Mr. MARSH. Exactly. That is just it.

Mr. SMITH. If that should be true, it seems to me it would be very important as to how the guns are to be distributed, between the army bill and this bill. If that is the fact, the Government of the United States can not use them without an act of Congress.

Mr. MARSH. The equipment goes with the troops when mustered into the service of the United States as volunteers.

General CROZIER. I think, as a matter of fact, it would, but as to the academic question of the law I do not feel competent to pronounce at this moment. I am including these in the 250 batteries that I am speaking of as our ultimate supply, with the idea of using them in time of war, and I have no doubt that they would be so used.

Mr. SMITH. Without reference to the law at that time?

General CROZIER. Yes; possibly.

#### TRANSFER OF UNEXPENDED BALANCES.

Mr. LITTAUER. Now, as to the next item of our bill, it is your evident desire to transfer the balances of certain unexpended appropriations for these special purposes. Are these various siege breech-loading mortars of 7-inch caliber out of date? That is on page 8, in italics. A suggestion is made there that the unappropriated balances should be transferred.

General CROZIER. I can explain that, Mr. Chairman. As you said a few moments ago, we have consolidated these appropriations under headings which enable us to intelligently separate the different classes. Now we have left-over balances of appropriation which were made under the old system, and these are such balances, and by this I am consolidating those under the headings we now use.

Mr. LITTAUER. Have you any designs to manufacture or procure such guns in the future as are specified here—guns or carriages?

General CROZIER. Many of them are of obsolete caliber. For instance, take the first one, siege mortar, of 7-inch caliber. We would in the future make that of 6-inch caliber.

Mr. LITTAUER. Why do you not then turn that money over to the surplus fund and come to us for new appropriations? In other words, for us to intelligently understand that paragraph we should have to know what these balances are.

General CROZIER. I am prepared to tell you, sir.

Mr. LITTAUER. Then kindly give us the amounts.

General CROZIER. Forty thousand three hundred dollars is the whole thing.

Mr. LITTAUER. Oh, I thought it might mount up to hundreds of thousands. There is nothing in this requiring that you should give us information about it.

General CROZIER. No; I noticed that when I picked up the bill, and I sent up to the office to get the exact amount.

#### PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR MACHINE AND AUTOMATIC GUNS.

Mr. LITTAUER. Now, the next item is the purchase, manufacture, and test of ammunition for machine and automatic guns. You began last year, after a couple of years elapsed, to provide for the store of this ammunition?

General CROZIER. Yes, sir. This estimate contemplates a supply for the amount of artillery of which I have just spoken, particularly of field artillery—I include ammunition to fill all the ammunition chests which go with a battery only, which will require for each field gun some 358 rounds and for each mountain gun 100 rounds.

Mr. LITTAUER. Then for each field gun your ammunition wagon would carry 358 rounds?

General CROZIER. Yes. We have, by the way, three ammunition wagons to each gun.

Mr. LITTAUER. That is the ammunition supply that would go with each gun?

General CROZIER. Yes, sir.

Mr. LITTAUER. Then this is sufficient for the guns?

General CROZIER. For the 250 batteries; not this amount—but I will go on and say that the rate of supply which I have proposed here gives us the amount which is necessary for the artillery which we contemplate procuring, such ammunition to be supplied by the year 1920.

Mr. LITTAUER. Is your ammunition supply going ahead of your gun supply?

General CROZIER. No; the gun supply would be finished by 1916, as I said a moment ago. This would cause the ammunition supply to be finished by 1920. This is for reserve ammunition only.

Mr. LITTAUER. Would you strongly recommend that we keep up this rate, which is \$116,000 more than the appropriation of last year? We gave you \$211,600 last year, and you ask for \$318,398 this year. It is a large increase.

General CROZIER. Last year the estimate was considerably more than was appropriated.

Mr. LITTAUER. Yes. Would not last year's basis of purchase be a fair one?

General CROZIER. Now, Mr. Chairman, this is what it will amount to: By this basis you will get a supply necessary to fill up the chests by 1920 for the guns that are necessary for an army of 500,000 men.

Mr. MARSH. Is this appropriation for the guns that are supplied to the militia?

General CROZIER. It includes those. It includes a reserve supply for those guns, so that when those guns are called into the service of the United States we will have the ammunition for them. But this ammunition will not pass into the possession of the militia beforehand, so that there will not arise that question that arose a moment ago as to the guns themselves.

Mr. LITTAUER. How fast can it be manufactured?

General CROZIER. We have a plant up at the Frankford Arsenal which, by the addition of some machines which can be quickly procured, can turn out 400 rounds a day.

Mr. MARSH. A little more than enough for one battery?

General CROZIER. A little more than enough for one gun—a complete filling of the ammunition wagons just of one gun.

Mr. LITTAUER. That is, to-day it would take you 250 days, with our present appliances, to fill the ammunition chests of our entire armament at once?

General CROZIER. It would take more than that. It would take four times that.

Mr. TAYLOR. It is this you speak of now that makes the necessity for the reserve?

General CROZIER. Yes, sir; I contemplate that on war becoming imminent we can increase the rate of manufacture and can turn this ammunition out as fast as they can fire it away; and for that reason I ask for no greater reserve than is necessary to fill the ammunition chests.

## PURCHASE, MANUFACTURE, TEST, AND ISSUE OF RAPID-FIRE GUNS.

Mr. LITTAUER. The next item is for the purchase, manufacture, test, and issue of rapid-fire guns. I suppose you have an available balance?

General CROZIER. That is one of the consolidations which have been made. Last year we separated the guns for coast defense into 8, 10, and 12 inch guns and rapid-fire guns; the rapid fire being smaller than those of the caliber of 8 inches. There seems no good reason for that separation. There is no sharp line that can be laid down between the rapid-fire guns and those which are not rapid fire, and therefore I have suggested this year in the estimate that seacoast guns, large and small, until we get down to the size of the machine gun, be grouped together.

Mr. LITTAUER. Automatic guns?

General CROZIER. Yes; they should be included in one item.

Mr. LITTAUER. But consider, General: We have been going along with the annual tables supplied to us of the number of various classes of heavy guns and mortars and rapid-fire guns needed to complete this great Endicott scheme. We have been watching carefully how many have been made in these headings here. Do you not think the consolidation would destroy the value of our statistics when you include the rapid-fire guns in with the 8, 10, and 12 inch guns?

General CROZIER. I think not, generally, Mr. Chairman. I think that distinction should never have been made.

Mr. LITTAUER. To-day, for instance, you told us that of the 8 and 10 and 12 inch guns, 334 out of the 364 have been provided with emplacements, while for the rapid-fire guns 402 out of 1,296 are either ready for armament or are under construction. That gives us an idea that the heavy armament is practically completed, while the intermediate armament—the rapid-fire means to us the intermediate sizes—is only half done.

General CROZIER. To illustrate how these guns shade into each other, I will say that the largest one of those rapid-fire guns, which have been spoken of heretofore, is the 6-inch gun, and the 6-inch is now a more powerful gun than was the 8-inch at the time this division was first made, so that that gun has gone over the line, so far as its power is concerned.

Mr. LITTAUER. But all our calculations have run on sizes and not on power.

General CROZIER. You have now completed practically the installation of large guns, and from now on you will be called upon, for the United States, to provide only these rapid-fire guns, and all the appropriations you will make will be for rapid-fire guns.

## PURCHASE, MANUFACTURE, TEST, AND ISSUE OF SEACOAST CANNON FOR COAST DEFENSE.

Mr. LITTAUER. Then, in other words, the item on page 10, "For the purchase, manufacture, test, and issue of seacoast cannon for coast defense," will practically mean rapid-fire guns?

General CROZIER. Yes; and it will mean also mortars. We spoke of that last year—of consolidating the mortars with the others—and it was remembered that there had been some question at one time as to

the use or usefulness of these mortars. The question had been raised by some military men. It was thoroughly thrashed out and tested by a tribunal which was as good and final a one as we knew how to create, and the decision was that the mortars were extremely useful and should be continued. Now that question has disappeared. You make appropriations for the Engineer Department for gun and mortar batteries. You do not divide the two. They divide them themselves.

Mr. LITTAUER. There is no great difference, is there, between an 8-inch and a 6-inch gun in cost and general outfit?

General CROZIER. No, sir; there is not.

I am speaking now, however, of the distinction between the gun and the mortar. For the Ordnance Department you have heretofore appropriated for guns and made a separate appropriation for mortars, but owing to the change made in the bill as it progresses the result has been sometimes that one or other of us—one branch of the Army intrusted with seacoast defenses—had an appropriation in the bill which we could not use.

Mr. LITTAUER. You mean either the Engineers or the Ordnance?

General CROZIER. Yes, sir.

Mr. LITTAUER. How could that be?

General CROZIER. Owing to the change in amounts their plans became different from those on which I had made my estimates. It occurred last year with reference to the insular possessions.

Mr. LITTAUER. Do you not reestimate after you get the appropriation?

General CROZIER. It is too late to reestimate then.

Mr. LITTAUER. Do you not remodel or modify your purposes?

General CROZIER. We try to. This is what occurred last year: The Engineer Department and my Department made estimates for gun and mortar batteries, for guns and for mortars for the fortification of the insular possessions. We agreed in our estimates. You cut the estimates down. You gave them less money for their mortar batteries, and you gave me less money for my guns and my mortars. They were cut down to such a figure that they would not complete any mortar batteries, but would put it all in guns. That made it impossible for me to use my money for mortars. I have used here, as you will notice, instead of the word "guns" the word "cannon," and I call your attention now to it in order that that change may not escape you. "Cannon" is a generic term, and covers both guns and mortars.

Mr. TAYLOR. Cannon includes both mortars and guns?

General CROZIER. Yes.

Mr. LITTAUER. It includes all guns—anything from the 16-inch gun down to the 12-inch mortar?

General CROZIER. Yes; down until you come to a field gun. Now we have the automatic, the field, the siege, and the seacoast gun.

Mr. LITTAUER. Will it eventually do away with the value of these subdivisions that we have been studying over in late years? For instance, next year we will be able, if you will include them all under one item, to see that we have 840 seacoast cannon emplaced, and 457 appropriated for, and 887 yet to complete to carry out the scheme?

General CROZIER. In our notes when estimating we are always prepared to give you the way in which we will divide this sum between the guns of the different classes.

Mr. LITTAUER. But you see Congress does not always make the appropriations in the amount you ask for. We may give you a limited appropriation. You want, for example, two of one kind, three of another, and six of another. We do not know in reality what you are going to use it for.

General CROZIER. We would not necessarily cut it down in all the items after that. If Congress wishes to keep track of the money expended for rapid-fire guns, this method of appropriation does not permit it. But as I say, the distinction between rapid-fire guns and other kinds of guns is disappearing.

Mr. TAYLOR. Why?

General CROZIER. Because the rapidity of firing of all is becoming such that they now are all rapid fire. I could make an 8-inch gun under the appropriation for rapid-fire guns.

Mr. LITTAUER. It is a mere matter of keeping track of what is going on, so far as I am concerned.

General CROZIER. Exactly. And I have put this in this way so that you can at once see how much money you are expending for artillery for coast defense—I suppose that is what you wanted to know, in one item—for ammunition, for torpedoes, for range-finding appliances, etc. The artillery I put together in one class, and it seems to me it gives a clearer and better view of what is being done with one element of coast defense than to separate into classes things which really shade into each other.

Mr. MARSH. And that would leave the Ordnance Department with a little latitude?

General CROZIER. Yes, sir.

Mr. LITTAUER. That would put it into categories—one the field and one the siege, etc.?

General CROZIER. Yes, sir.

Mr. LITTAUER. Your estimate under this amalgamated heading is \$559,000, as against \$180,000 plus \$618,000 last year?

General CROZIER. Yes, sir.

Mr. MARSH. Is that on page 8?

Mr. LITTAUER. That is on pages 9 and 10. The estimate of \$559,000 is on page 10, but to compare that with the past you must take in the item appropriated for this year printed on page 9, \$618,000, and also the other appropriation of \$180,000 mentioned on page 10, making \$798,000.

General CROZIER. The appropriation is really \$225,000 or \$238,000 reduced.

Mr. LITTAUER. But in view of the fact that the Secretary of War recommends that there shall be no further construction of gun and mortar batteries—in view of that fact—

General CROZIER. These notes explain that.

Mr. LITTAUER. Yes; these notes explain.

General CROZIER. This is what it is expected to procure: Twenty-two 4½-inch shields for 5-inch rapid-fire guns and carriages at \$7,000, making \$154,000. That is one large item. These shields have been considered necessary, and they should be added to the guns which have already been provided for.

Then there is included fifteen 2.38-inch rapid-fire guns—those are 7½ pounders—with gun carriages and limbers, which are part of the



armament intended to be used against troops landing in the vicinity of fortifications. That amounts to \$84,000.

Then we need to complete seventy-four 15-pounder rapid-fire guns and mounts which the engineers already have emplacements for, and which were included in former estimates that we submitted, but which, on account of the very large price for shields, which we did not anticipate, we have not been able to complete, \$160,000.

We have one 16-inch gun, which is a good one. We do not intend to reproduce it, although it is a success, because we think we can get the better of the enemy with the 12-inch gun which we now have.

Mr. MARSH. Get what?

General CROZIER. Get the better of the enemy.

Mr. LITTAUER. The 12-inch gun can shoot as far as you want to shoot and hit with as great an impact as anything can withstand?

General CROZIER. Yes. If we should change that policy, we might make more of the 16-inch guns, but we are not contemplating that at present. That, however, does not prevent us from utilizing the 16-inch gun that we now have. We expect to complete only the one carriage for this one gun. We have never built a 16-inch carriage before. It will be a new size, and it will require some \$50,000 more, making, with the \$40,000 already available, \$90,000 for that carriage.

Mr. LITTAUER. What did the gun cost?

General CROZIER. The gun ought to have cost \$150,000. If we were making them in quantities, we could make them for \$100,000 apiece. That is included in here—\$50,000 for that purpose, for completing the carriage for that 16-inch gun.

Then this item also includes one 12-inch mortar, to replace one which was injured a month or two ago by an accident—by an accidental discharge, owing to a fault of manipulation in target practice. They had an accident, and killed a man or two, and disabled the mortar, and we need \$11,000 to replace it.

Then for finishing and assembling seacoast guns, for which forgings were provided some years ago, I will need \$20,000. Then follow small items of \$10,000, \$5,000, \$25,000, and finally, for proof of these guns and carriages, which means principally powder, \$39,680. This will make up the sum of \$559,282 which I have estimated for. It does not involve any new construction, which we have concluded to suspend.

Mr. TAYLOR. To postpone?

General CROZIER. Yes, sir.

Mr. LITTAUER. "Finishing and assembling seacoast guns"—how many would you finish and assemble?

General CROZIER. That is for completing. The manufacture is pretty well along. I think there are about 25 involved. They are almost finished.

#### PURCHASE, MANUFACTURE, AND TEST OF AMMUNITION FOR SEACOAST CANNON.

Mr. LITTAUER. Then we come to ammunition for seacoast cannon. Last year we gave you \$330,000, plus \$107,000. You ask for \$716,000 this year?

General CROZIER. Yes, sir. I think we are providing an allowance of a hundred rounds for each gun. Is that it?

Captain DICKSON. Yes, sir.

Mr. LITTAUER. That was the recommendation of the Board of Ordnance and Fortifications, if I remember rightly, a year or two ago.

General CROZIER. They might have made the same recommendation also. I do not remember that. This has been passed upon as the proper number by several different sets of people at the War Department. There is included 250 rounds per gun for the rapid-fire guns from the 6-inch gun down, and the rate at which this appropriation will permit the ammunition to be procured will give us a reserve for the number of guns which we expect to have by the year 1920; for as many seacoast cannon as we expect to have mounted by June 30, 1905, which is pretty nearly all that is provided for. You can see exactly what it will do. We are not entirely without reserve ammunition. We have something to commence a war with, if we should get into one. But the amount I estimate for is considered necessary.

Mr. LITTAUER. Is much of this manufactured by the Government, or is it by outside concerns?

General CROZIER. Most of it by outside concerns.

Mr. LITTAUER. Have they a large capacity?

General CROZIER. They have a considerable capacity; yes.

#### PURCHASE, MANUFACTURE, AND TEST OF INSPECTING INSTRUMENTS.

Mr. LITTAUER. Now, as to the purchase of inspecting instruments. Do you contemplate much of an expenditure under that heading?

General CROZIER. The largest item is for 50 position finders at \$1,200 each, which would amount to about \$60,000. Then the other items would give us what is stated in the note here. The amounts for the different items run about as follows: \$15,000, \$4,000, \$10,000, \$24,000, \$7,000, \$4,000, \$2,000, \$6,000, \$2,000, and finally \$20,000.

Mr. LITTAUER. And \$20,000 is for the four star gauges?

General CROZIER. No; \$20,000 is for machinery. Out of this \$155,000 I expect to use \$20,000 for putting in machinery for manufacturing instruments of precision in the building, which is already partially equipped at the Frankford Arsenal.

Mr. LITTAUER. Can you give us the amount that would be needed under the field batteries?

General CROZIER. Seven thousand two hundred dollars for field batteries. Now for foot troops or infantry and for cavalry and engineer troops a number of range finders would be required which would amount to \$4,000. The star gauges spoken of, which are for the manufacture of guns—I mean used in the manufacture of guns, and not used by the troops themselves—would amount to \$2,500. Other instruments, for use in the manufacture of guns and for use in the manufacture of ammunition, but which are not used for troops, would be \$8,200.

Mr. LITTAUER. Are there any further questions, gentlemen?

#### AMMUNITION FOR SEACOAST ARTILLERY PRACTICE.

Now we come to the amount of appropriation for artillery practice—ammunition for artillery practice—seacoast artillery practice.

General CROZIER. Seacoast artillery practice; yes, sir. That is estimated for by itself, and is distinct from field artillery practice. A programme has been drawn up of artillery practice and approved by

the Chief of Staff, contemplating a certain number of rounds and certain kinds of ammunition for each battery per annum. That, of course, calls for a definite amount of ammunition, and the value of it amounts to the figures of this estimate. In fact it would come out some \$46,000 more than the figures of the estimate, but I am counting on some of the batteries not being able to carry out the programme, owing to change of stations and various other interfering causes. It is possible that a still greater number than I have thought might not be able to carry out their practice. Last year we got \$374,000 for this purpose. I can not say at present that there will be a shortage.

Mr. LITTAUER. Have the number of artillery posts been increased? Your note states there, "New artillery posts to be considered, 6."

General CROZIER. Those must be posts that have been garrisoned by troops brought back from across the sea.

Mr. LITTAUER. The appropriation for last year gave you \$374,000 for both seacoast and field practice?

General CROZIER. That is so. They were not separated. We used the money for field practice out of the reserve supply. None of the appropriation under artillery practice has heretofore been so used, but this year for the first time I am separating the reserve field artillery and the field ammunition for target practice.

Mr. LITTAUER. How did you get this money in the past?

General CROZIER. The ammunition for field artillery has been appropriated for in a lump sum, and we have taken from that what was necessary for target practice. Now, under this arrangement, you can see what you are providing for use in time of war, and what you are providing for target practice in time of peace.

Mr. LITTAUER. You are asking now for a large sum in comparison with what has previously been appropriated for the alteration and maintenance of mobile artillery. That means for field and siege guns, does it not?

General CROZIER. Yes; that is the appropriation which is used for the purpose of keeping this artillery up to date.

Mr. LITTAUER. Remodeling field artillery?

General CROZIER. There is not much remodeling to be done. The largest item in that sum which has to be appropriated is intended to be applied to putting in good order, as a reserve, a number of batteries of 3.2 inches caliber, field matériel, which for a number of years will constitute the only reserve we have.

Mr. LITTAUER. They are of a pattern of guns that you mean to discard?

General CROZIER. Yes.

Mr. LITTAUER. But you think we ought to expend this money to keep them in order, so as to use them in an emergency?

General CROZIER. Yes; \$45,000 of it. As I said a moment ago, it will be 1916 before we get the supply of guns that is considered necessary to go to war with, and in the meantime, for a period of 12 years, the only reserve that we will have for use in case of war will be the guns we now speak of. I propose to put in good order those that are turned in, so as to have them in proper shape if they should be wanted, and to keep them in such a way that they will not deteriorate.

Mr. LITTAUER. How can they deteriorate if kept in proper or suitable places?

General CROZIER. Wood is used in the construction of the caissons and ammunition chests and wheels, and unless the wooden parts are kept properly painted and cared for they will rot; and unless the metal parts are carefully greased they will rust, and the parts will stick together and be injured when an attempt is made to get them apart—that is, parts of the breech mechanism.

ALTERATION AND MAINTENANCE OF SEACOAST ARTILLERY.

Mr. LITTAUER. The next item is for the alteration and maintenance of the seacoast artillery. I see the note explains the estimate. Will that bring the entire coast artillery into such shape as you are making the new guns included in this category?

General CROZIER. It will not put all of them in that condition.

Mr. LITTAUER. What proportion of the seacoast artillery now installed will be up to your best models after you have expended this sum? In other words, is this to be a continuing appropriation for a great number of years, to bring these earlier installed guns up to date?

General CROZIER. At the rate that it is proposed here, I think it will take something like three years to bring them all up to the latest.

Mr. LITTAUER. In other words, to make them as fully efficient as your latest it will take three years, at half a million dollars a year?

General CROZIER. Yes; and I hope that improvements will be devised in the meantime to call for an expenditure of still more money for still further improvements.

Mr. LITTAUER. In other words, we see our prospect before us?

General CROZIER. Yes; and let me invite your attention, Mr. Chairman, to the fact that this is a distinct gain; for so long as we can bring a gun by an added improvement up to the point of efficiency of the latest, by that means we avoid the necessity of replacing it with a new gun; and since 1888 none of the guns have yet reached a state of obsolescence. We have been able to bring them up and up by changes so that all are efficient. None of them have gone into the scrap heap.

Mr. LITTAUER. The next item is for 8-inch, 10-inch, and 12-inch guns manufactured by contract.

General CROZIER. That winds it up.

PROVING GROUND, SANDY HOOK, N. J.

Mr. LITTAUER. Is there anything particular in your estimate for the proving ground at Sandy Hook, with the exception of straightening out that track?

General CROZIER. The items are very much as they have been before.

Mr. LITTAUER. Can we cut them down?

General CROZIER. They have been cut so vigorously already that that process could not be applied any more. They have been cut by a very large percentage before being presented here. And I will say that if you find yourselves able to increase any of that at all, I would ask that you increase the appropriation for straightening out the railroad.

Mr. TAYLOR. Where is that?

Mr. LITTAUER. On top of page 16.

General CROZIER. It is in very poor condition. It ought to be repaired. The ties are rotting, and considerable money will have to be expended on it, anyway. Another thing, it now runs in the field of fire—it interferes with the firing of the guns. When we prove and test the guns we have always to look out for the train. There is always a possibility of an accident, but we have thus far worked without one. The railroad is now used more than ever before, not only for the transportation of things to the proving ground, but at Fort Hancock the use has been increasing. I do not think it will increase much more, but we carried last year 121,000,000 pounds of freight and 160,000 passengers on it. It seems worth while to put the line of that railroad out of the field of the fire of the guns.

Mr. LITTAUER. It is in the general field of fire?

General CROZIER. Yes; it runs over so that when we fire down the beach—fire at our targets or for velocity through the screens which we must place on land—the trajectory will run over the line of this railroad.

#### WATERVLIET ARSENAL.

Mr. LITTAUER. Now we come to the Watervliet Arsenal. How are you able to keep the Watervliet Arsenal busy? That is on page 69, at the bottom. I believe I read somewhere in your report that you had 490 men engaged there, and that your expenditures were \$705,000. Will you be able, with your estimates as made this year, to keep this arsenal busy?

General CROZIER. A good deal of work is now being done up there on field material.

Mr. LITTAUER. And also for the Navy and Life-Saving force?

General CROZIER. We are making now 48 heavy guns of 7 and 8 inch caliber for the Navy. The plant is not all employed.

Mr. LITTAUER. Has not the Navy more work that they could give you?

General CROZIER. We are quite willing to do it if they have, particularly in the larger guns. I expect to keep that portion of the plant which is suitable for the manufacture of smaller guns employed, particularly that portion pertaining to field and siege guns. As we are not now making any more heavy guns ourselves their portion of the plant is not fully occupied.

Mr. LITTAUER. Then your estimates are designed to make the outfit more serviceable for the manufacture of smaller guns?

General CROZIER. Yes.

Mr. LITTAUER. Do you think we had better make that purchase of machines and tools—\$17,500—to bring in smaller lathes?

General CROZIER. It is not as important as the preceding item—\$14,000—for alteration of cranes, which I consider absolutely necessary.

Mr. LITTAUER. You say in the note, there, that they are so worn out and cost so much to repair that you think it is absolutely necessary.

General CROZIER. Yes. Now, these other machines are needed, too. That is a comparatively small amount when you consider the value of the plant up there. It is a very small percentage of it. A plant that does not continually put in new machines in this way will speedily become antiquated and expensive to operate.

Mr. LITTAUER. This is to adapt the plant to the special purposes you now have in view—the manufacture of smaller guns?

General CROZIER. Yes; the largest machines that I am contemplating procuring are two 48-inch lathes. They are not themselves very large machines.

Mr. LITTAUER. You do not need \$17,000 for lathes?

General CROZIER. That is the principal item. I will run over what I need and what I intend to procure: Two 48-inch forge lathes, a dovetailing machine, and two engine lathes. That is all.

#### WATERTOWN ARSENAL.

Mr. LITTAUER. Now, then, the improvements at Watertown Arsenal.

General CROZIER. Watertown Arsenal is the gun-carriage manufactory. We will be using it for some time to come for these seacoast carriages for the insular possessions. It is the most backward of all the large arsenals in its plant. Very large estimates have been submitted by the commanding officer for things which would improve the plant. I have cut them down very considerably, and I have left these items that are found here. I think that these are necessary. I do not think they would be as large as they are now if the subject had been attended to as well as I think it should have been in the last ten or twelve years; but the plant has been allowed to run down. Improvements have not been put in, and it has not been kept up as it should have been, and the work is not carried on as efficiently as it ought to be. I have no desire to enlarge that plant, or put up any more buildings, or increase its capacity by any other method than by putting in better machinery. I want it to be a good plant, but I do not intend to increase its capacity. We can go to outside manufacturers when it is necessary to go beyond the productive capacity of the plant.

#### SUBMARINE MINES.

Mr. LITTAUER. Now we come to the item for submarine mines, on page 18. What part of that do you estimate for?

General CROZIER. I do not estimate for any of it. I supervise the disbursement of all of it.

Mr. LITTAUER. You are not responsible for the estimates?

General CROZIER. No, sir; I am not responsible for the estimates.

#### SEACOAST CANNON FOR INSULAR POSSESSIONS.

Mr. LITTAUER. Now we will take up the item for seacoast cannon for insular possessions, on pages 18 and 19.

General CROZIER. That estimate is made to balance the one that has been submitted by the Chief of Engineers.

Mr. LITTAUER. You told me that the appropriation this year left the proposed work in an unbalanced state?

General CROZIER. Yes.

Mr. LITTAUER. Is this designed to make up for the past, and also to provide for the future?

General CROZIER. The appropriations are in an unbalanced state in two particulars. One of them is with reference to the mortars, of which I spoke a moment ago.

Mr. LITTAUER. That you will overcome with the verbiage proposed?

General CROZIER. Yes; we expect to overcome that by a different wording. The other particular is with reference to the utilization of some guns that we have already built in the United States.

Mr. LITTAUER. That is your additional recommendation, but you estimated for \$793,000—no, I beg pardon, you would include these guns to balance up the appropriation for the construction of batteries?

General CROZIER. Yes; we will have to have this \$793,000 and the authorization to use some of these guns in addition, in order to balance what has been estimated for by the Engineer Department.

Mr. LITTAUER. Are these guns a surplus beyond what has been estimated for in the engineer's emplacements?

General CROZIER. They do not go beyond the plans for defense which have been made and approved, but they do go beyond the appropriations for emplacements, and there is a tendency to consider that those emplacements, particularly for heavy guns, were not to be much increased, if any.

Mr. LITTAUER. Can you give us a general idea of how much money we could actually expend if we would transfer these guns to the insular possessions? We are trying to keep the cost of the fortifications of the insular possessions by itself, so as not to confuse them with anything in the United States.

General CROZIER. Yes; I can tell you that. About \$380,000.

Mr. LITTAUER. Are there any more questions on that item?

#### AMMUNITION FOR SEACOAST CANNON, INSULAR POSSESSIONS.

Go on, then, to ammunition for insular possessions for seacoast cannon. That is to provide such a supply as you state you want in the note at the bottom of page 19. You want \$176,000. Will you at the end of this year which we are appropriating for have enough guns mounted to warrant such an expenditure?

General CROZIER. That expenditure will provide one-fourth of the estimated reserve for the guns which have thus far been provided for, including those in these estimates.

Mr. LITTAUER. The note here says: "Estimated to procure the following complete rounds, the reserve supply, including powder and projectiles," and so on. What does that mean?

General CROZIER. Powder, projectiles, cases for storing powder, fuses, primers, high explosives, etc.

Mr. LITTAUER. Here we would really be appropriating for ammunition before the guns are in place?

General CROZIER. Yes; but you are not appropriating by 75 per cent the complete sum required to provide these guns with a reserve that they ought ultimately to have.

Mr. MARSH. How long would it take to prepare this ammunition that is appropriated for?

General CROZIER. I do not know whether I can get it all in a year, Colonel, or not.

Mr. MARSH. At the end of the year will the guns be ready?

General CROZIER. No, sir; they will not.

Mr. MARSH. Will any of the guns be ready then?

General CROZIER. Oh, yes; some of them will.

Mr. MARSH. Not sufficient to serve the full purpose?

General CROZIER. They will not all be ready, and I should think

that an appropriation for ammunition to cover all of them would have to be larger by one-quarter.

Mr. TAYLOR. I understood you to say that provided for the reserve contemplated to be provided by 1920.

General CROZIER. No; the year 1920, as I used it, did not refer to the insular possessions. If we should start in now, providing for the ammunition for these guns, we would be more fullhanded than we were when we started in with our own coast-defense guns. We contemplate now commencing with the ammunition for the insular possessions and supplying \$176,000 from this appropriation, and next year probably I will ask for another fourth, and instead of running until 1920 before we get the full supply, we ought to get it in four years.

Mr. TAYLOR. That is for insular possessions?

General CROZIER. Yes. With reference to the insular possessions we should not be behind at all, whereas with reference to the United States we are sixteen years behind.

Mr. LITTAUER. In the item on page 20, for range finders, you do not propose in your note, there, to supply any instruments for testing and inspecting, but you propose here to purchase actual range finders? The appropriation is made in the same language as this previous item on page 11, that I saw fit to criticise a little.

General CROZIER. Yes.

Mr. LITTAUER. The range finders, I think we will agree, should be provided for the cannon as soon as emplaced.

General CROZIER. They will require nearly three-fourths of the entire sum.

Mr. LITTAUER. What is the balance for?

General CROZIER. I should say range-finders and their accessories would call for all of this amount except \$1,794.

Mr. LITTAUER. What is that for?

General CROZIER. The cost of inspection of the instruments.

Mr. LITTAUER. Inspecting the instruments for manufacturing?

General CROZIER. No; the cost of the inspection of these instruments during manufacture, that is, the range-finders, etc.

Mr. LITTAUER. Can we not change that verbiage or leave out that part of it?

For purchase, manufacture, and test of inspecting instruments for the manufacture of cannon, charges, and ammunition; range finders and other instruments for fire control at the fortifications in the insular possessions.

I do not want to see one set of instruments over at Manila and another at Hawaii—inspecting instruments for the manufacture of cannon.

General CROZIER. No, indeed; we propose to manufacture the guns—well, we will say (jocularly) in New York State.

Mr. LITTAUER. Wherever they are you have already provided yourself with inspecting instruments in the United States proper.

General CROZIER. That supply has got to be continued.

Mr. LITTAUER. We make appropriation for that in another item.

General CROZIER. I do not think that is very important just at the present. I would not object to these words going out, but the guns for the insular possessions should really bear their proportion of the expense of inspecting instruments, so that they would not be leaning on the home production for expenditures and costs which do not appear in these appropriations.



## ALTERATION AND MAINTENANCE OF SEACOAST ARTILLERY, INSULAR POSSESSIONS.

Mr. LITTAUER. The next item seems to mean the establishment of an ordnance repair shop over at Manila. Have we a navy repair shop there?

General CROZIER. We have an ordnance repair shop there and quite a good one. I employ something like 200 people there, mostly natives, on wages varying from \$1 to 40 cents a day. I have American superintendents, foremen, and master machinists, a few of them—I do not think over one dozen or fifteen Americans. This supply will keep those artillery machines in repair.

Mr. LITTAUER. Are those the milling machines and things of that sort that are necessary—

General CROZIER. To repair shafting and breechblocks, and things that get broken.

## FIRE-CONTROL INSTALLATIONS.

Mr. LITTAUER. Now, we come to the matter of fire-control installations. Have you any information that you wish to impart to us in that connection?

General CROZIER. The only thing I can say is that the item does not come under me.

Mr. LITTAUER. We would nevertheless like to hear from you any general remarks you may want to make in connection with the increased efficiency and value of the guns in connection with the fire control and range finders, etc., such as the new project calls for.

General CROZIER. That system constitutes an artificial aid to the natural vision. We can do very good firing without the assistance of this kind of installation up to something like 2 miles range. It is quite possible to make a fairly good estimate of the distance of a target when it is not farther away than 2 miles, and if the target is missed it is not difficult to see and estimate fairly and justly how far short of the target the projectile has fallen, judging by the splash, or how far beyond it has fallen, and make a pretty good correction of the aim; so that at the range of 2 miles, without this system, we are pretty certain to knock an ordinary target to pieces.

Now we have so improved the guns and added to their efficiency that they will send their projectiles with accuracy and precision for a range far beyond 2 miles.

Mr. TAYLOR. So far as their power and accuracy is concerned?

General CROZIER. Yes; easily up to 6 miles. That is far beyond the capacity of human vision to judge as to the effect of the shot. It is not, for instance, difficult to judge as far as direction is concerned. With a good telescope one can see by the splash whether he has gone to the right or to the left of the target. But one may fire and may think that his shot has fallen just short of the target, and may say to himself, "I made a beautiful shot; I am almost on the vessel I am shooting at; if I raise the gun just a little bit I will hit the target," or something like that, when as a matter of fact he may have been 500 yards short, or perhaps 500 yards beyond, for at that distance it is impossible to see the expanse of water that is between the place where the shot fell and the target.

Mr. LITTAUER. That would be true even with what you call the depression finder?

General CROZIER. Yes; that is much more accurate than the human vision. But unless it has a high base it is subject to some inaccuracy, although in a less degree—unless it has a high vertical base, as we call the vertical distance from the base down to the water level.

Mr. TAYLOR. That is the tower——

General CROZIER. Yes. Now, by the use of this range-finding system we have made it possible to keep the enemy out about as far as the range at which we were able to do accurate shooting before we established that system, and therefore I should say that each one of our guns is, at a moderate estimate, twice as efficient as it was before this system was introduced.

Mr. LITTAUER. It brings in one other condition, and that is that the attacking force, the battle ship, has not the same advantage and can not obtain it?

General CROZIER. Yes.

Mr. LITTAUER. They can fire effectively only within 2 miles?

General CROZIER. Well, in some recent actions, notably the one off Port Arthur between the Japanese and Russian fleets on August 10 last, the range varied from 3,000 yards up to 8,000 yards, but most of the time it was 6,000 yards. There the *Czarevitch* received, for a large portion of four hours, the main fire of the Japanese fleet, within a range somewhere between 6,000 and 7,000 yards most of the time, and yet she was seriously hit only seventeen times.

Mr. TAYLOR. How much difference was that from the distance of the range of firing at Manila Bay, when Admiral Dewey had his fight over there?

General CROZIER. His ranges, I think, were shorter. They did not run up as high as 7,000 or 8,000 yards. They were from 3,000 to 5,000, as I remember.

Mr. TAYLOR. What was it at Santiago?

General CROZIER. The range was from 3,000 to 5,000 yards. The *Cristobal Colon* ran out of range altogether. For a considerable time she was entirely out of range of our guns and the firing ceased for a time, and when the *Oregon* overtook her she commenced firing and presently sent a projectile beyond the *Colon*. The *Colon* then gave it up and ran ashore.

Mr. TAYLOR. What I mean is, Would our guns have damaged the Russian battle ships at the same range as that at which the Japanese assaulted them?

General CROZIER. Yes; I think that with such a number of guns, firing as they did there and with this method of pointing, we would have scored a great many more than 17 hits.

Mr. LITTAUER. Seventeen hits out of more than 300 or 400 shots?

General CROZIER. Yes.

Mr. BRUNDIDGE. My recollection is that when this appropriation of \$300,000 or \$400,000 was made by Congress it was stated to the committee that none of this fire-control installation had been completed, and it was estimated that they would cost \$400,000 each, but not a single one was in actual operation then. Is that correct?

General CROZIER. I do not think it is correct now.

Mr. BRUNDIDGE. I mean a year ago?

General CROZIER. I think it was correct then, in that no one place had its installation completed.

Mr. BRUNDIDGE. How many have been completed since then, and what has been the actual cost of completion? The \$400,000 was only an estimate of the cost.

General CROZIER. So little of that comes under my department that I would hesitate to answer the question; but I will say this, that so far as the appropriation for the instruments which I supply is concerned, I am ahead of the Engineer Department and the Signal Corps.

Mr. LITTAUER. Let me try to elucidate this. A year ago the experimental installation at Pensacola, although not in permanent shape, was in practical shape, and had proved to be a system?

General CROZIER. Yes, sir.

Mr. LITTAUER. Conclusively, to your mind?

General CROZIER. I was not there, and did not see it operate. But a few days ago I was down at Fort Monroe, and there I saw three batteries engaged in target practice in accordance with this system, for which the installation had been made, and that enables me to add Fort Monroe to the places which I heard mentioned in your presence this morning, at least as far as those three batteries were concerned.

Mr. LITTAUER. You mean by that they got splendid results at long ranges?

General CROZIER. Yes.

Mr. LITTAUER. Such results as could not be achieved by individual vision?

General CROZIER. It would have been impossible to do it.

Mr. TAYLOR. Or with any previous device?

General CROZIER. Yes. The target was a dim object, so far out as scarcely to be seen with the ordinary field glass, and quite invisible to the naked eye. It was perfectly impossible to tell how far short or how far over the splashes were. But by means of this auxiliary triangulation arrangement they were able to tell exactly where the shot fell, and able to score a hit almost at every round; and the whole thing was conducted with such a degree of equipoise, and with such an absence of hurry and confusion, or of uncertainty and effort, and with such a total lack of noise, excitement, or loud talking, that it was very impressive indeed. In other words, it seemed as though those noiseless men were merely at work in a leisurely way over their plotting boards, giving their instructions and communicating the information that came to them in a manner that resembled a group of expert engineers coolly looking over a large plot, with casual comments and remarks from time to time while proceeding to lay it out.

Mr. LITTAUER. The method was good and the object was achieved?

General CROZIER. Yes, sir.

Mr. MARSH. What was the distance?

General CROZIER. It varied from 3,500 yards to between 6,000 and 7,000 yards. The target itself changed its range, which made it more difficult to follow it than if it had been the same. The guns had to be changed all the time.

Mr. MARSH. You say the target was moving?

General CROZIER. Yes. It consisted of a floating structure towed by a tug moving at the rate of about 7 miles an hour.

There is this to be said, Mr. Chairman: We had a considerable advantage over the gentlemen afloat even before we introduced this

system. With the very efficient installation of good guns that we have along the seacoast now I think it might be possible to defeat the enemy, even without taking so much advantage of him.

Mr. LITTAUER. Is not that the great advantage of a land-placed gun over the navy emplacement? And should we not therefore take full advantage of what we possess?

General CROZIER. It would seem so; certainly. And that is what I was coming to. We can, by putting in this system, increase the efficiency of our guns to such an extent that it is very doubtful if you will ever have to come to the strict provisions of the Endicott scheme.

Mr. LITTAUER. In other words, it is doubtful that we will ever have to complete it?

General CROZIER. Yes.

Mr. LITTAUER. If we complete this range-finding and fire-control system, with a battery of four guns we would probably feel that we were strong enough to achieve an object for which in years gone by we would have had to place a battery of six or eight guns?

General CROZIER. Yes, sir. That is a concise statement of its value.

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THURSDAY, *December 15, 1904.*

There appeared before the subcommittee Brig. Gen. John P. Story, Chief of Artillery, U. S. Army, accompanied by Capt. E. A. Millar, assistant to the Chief of Artillery, also Brig. Gen. A. W. Greely, Chief Signal Officer, U. S. Army.

#### SUBMARINE DEFENSE AND FIRE-CONTROL.

#### STATEMENTS OF BRIG. GEN. JOHN P. STORY AND BRIG. GEN. A. W. GREELY.

Mr. LITTAUER. General Story, your bureau does not have the handling of any moneys in connection with submarine defense or with the fire-control, but as we understand it, appropriations under these items are made as you suggest or direct.

General STORY. By my suggestion and request. We have not the final say about that at all.

Mr. LITTAUER. Who has?

General STORY. The estimates can be modified, some of them by the Chief of Ordnance and others by the Chief of Engineers and such officials. Of course, in the construction work we are compelled to abide by the recommendation of those who have directly the work in charge. We have no say and necessarily would not have at any time. I understand there have been reductions—

Mr. LITTAUER. Reductions because of limitations of appropriations or disapproval of the plans?

General STORY. Oh, no; simply to reduce the amount which they have asked; nothing of the plan.

Mr. SMITH. Reduction of estimate rather than allotment?

General STORY. Estimate. Our putting in estimates, you might say, is in a way informal. The Chief Signal Officer or the Chief of Ordnance or the Chief of Engineers, in the matters which pertain to

their bureaus, really make the estimates, and that is considered the official estimate.

Mr. LITTAUER. Let us first take up the question of submarine defense, General?

General STORY. I would like to say, before going into that, that I wish to show my relation to that as approved by the Secretary of War, and I think it will give you an idea of my responsibility. We have at Fort Totten a board called the torpedo board, consisting of the commandant of the school of submarine defense and selected officers. The Secretary of War prescribed my responsibilities in this way: "While the responsibility of the prompt preparation of the general plan for torpedo defense must rest primarily with the torpedo board, and to such extent as its relations and responsibilities require of the Board of Engineers, the final responsibility for preparedness in matter of plans and arrangement for the locating and laying, maintaining and operating of torpedoes must rest with the Chief of Artillery." There you find my responsibility clearly fixed.

Mr. LITTAUER. Yes. In calling our attention to the responsibility, you leave us to infer that while you have the responsibility you have not the complete control of bringing equipment up to the point where you wish to assume the responsibility.

General STORY. I have no control over it.

Mr. LITTAUER. Well, understanding that to be the case, we now want to find out the necessity for the appropriations for submarine defense, which are divided into two parts, one the insulation in the Engineer's Department, and the other the purchase of material for mines, etc., by the artillery.

General STORY. The Ordnance Department.

Mr. LITTAUER. Yes. Now, in what condition is the fixed plant on land, the plant that the engineers must provide for? Has there been any change in the system of submarine defense?

General STORY. There will be a difference in the way in which mines will be planted, and there probably will be a difference in the selections of mine fields.

Mr. LITTAUER. I am now talking about that part of submarine mine equipment which the engineers discharge, and which I understand is on the land.

General STORY. There is no change there. In every place it has not been completed by any means. There is an estimate submitted by the torpedo board which shows where money is needed. In some places the locations of casemates and the loading rooms and storerooms are very faulty.

Mr. LITTAUER. I have been given to understand, especially two years ago or a year ago, in the report of the engineers, that an appropriation of \$225,000 would complete the rebuilding of all that was necessary in connection with their end of the submarine plant. Now I notice that the estimate for the present year is \$400,000, and even that was cut down by the Secretary of War from \$600,000. Can you give us any more definite information as to what you think would be the necessary cost of bringing this work up to a proper state of efficiency?

General STORY. Under this letter and action of the Secretary of War, dated June 23, or possibly it was early in July, the torpedo board was instructed to complete full estimates for the completion of the entire

torpedo defense necessary—everything that was necessary. My notion is that a torpedo defense should be completed within forty-eight hours after you undertake to lay it down. These are the estimates: For submarine mine appliances, \$2,308,395; casemates under the engineers, \$1,220,625, and for boats, \$290,000. Heretofore boats have been constructed in the Quartermaster's Department.

Mr. LITTAUER. In the Quartermaster's Department?

General STORY. They have always taken supervision of the construction of boats.

Mr. LITTAUER. The boats or any construction of boats in connection with mine fields has never entered this fortification bill.

General STORY. I suppose not.

Mr. LITTAUER. That would come under an entirely separate department.

In this connection here you state it will take \$1,220,000 to perfect the casemates and their accessories.

General STORY. Yes.

Mr. LITTAUER. Has there been any improvement in manufacture—any change of system?

General STORY. No; but they have not been constructed in all harbors. Some of them are not large enough in their rooms.

Mr. LITTAUER. Is this a necessary expenditure in order to properly lay down the mines?

General STORY. To operate them. These casemates, and so forth, include loading houses, storehouses, and the like. We have of storehouses exceedingly few in the United States and few loading rooms.

Mr. LITTAUER. That would be a matter of plan?

General STORY. Yes, sir; a matter of detail.

Mr. LITTAUER. You ask here for an appropriation of \$300,000 this year, and you state to us that the total needed expenditure to bring the equipment up to its proper standard would be how much?

General STORY. Two million three hundred and eight thousand three hundred and ninety-five dollars.

Mr. LITTAUER. What would that vast sum be expended for?

General STORY. I think you have the headings in that paper that I have given you, and it would be easier to read them than to enumerate them.

Captain MILLAR. I can read them off. "Switchboards, rotary transformers, operating boxes, storage batteries, testing sets, oil engines, voltmeters, telephone sets, small parts, anchors, mine cases"—

Mr. LITTAUER. You have got so far in enumerating the electrical appliances and parts, and I would like to ask what is the amount of those parts as separate from the others?

Captain MILLAR. Nine hundred and twelve thousand seven hundred and forty-five dollars.

Mr. LITTAUER. Then, for the electrical appliances there would be needed about \$912,000?

General STORY. Yes, sir.

Mr. LITTAUER. What is the other category?

Captain MILLAR. In this estimate it is cables.

Mr. LITTAUER. How much for cables, and similar needs?

Captain MILLAR. One million one hundred and thirty-six thousand four hundred dollars.

Mr. LITTAUER. Now, what would there be in addition to that?

General STORY. Explosives that are placed in the mine cases. There is a very large expense.

Mr. LITTAUER. How much?

General STORY. Two hundred and fifty-nine thousand two hundred and fifty dollars.

Mr. LITTAUER. Well, now, during the years past from the various appropriations you have been acquiring a large amount of this material, have you not?

General STORY. A great deal has deteriorated in store.

Mr. LITTAUER. The mines themselves?

General STORY. No; but we need a great many to complete them. The wording of that is "complete."

Mr. LITTAUER. You lead us to infer that the present equipment for the mines must be very insufficient.

General STORY. Insufficient to the extent that is shown in the estimates.

Mr. LITTAUER. We have been advised that our equipment of submarine mines—those in place—was a very complete one. Is that contrary to your judgment?

General STORY. That is contrary to my judgment. It is contrary to my judgment from what I have heard from the engineer officers. In some cases when they endeavored to recover the mines they found that they could not do it, and they had to be exploded in place.

Mr. LITTAUER. Do you mean that the mines that were in place had to be blown up before they were taken up?

General STORY. Yes; I think so, with some exceptions.

Captain MILLAR. A few were exploded. I think the great majority or them were not. As far as I know, very few were exploded. And there were several accidents.

Mr. LITTAUER. But several accidents would not account for the destruction of that amount of material for submarine mines scattered all along our coast.

General STORY. The torpedo board knew exactly what we had in every place, and my instructions were to complete what was necessary. They have a list of everything.

Mr. TAYLOR. Could you furnish us with that data, as to what was destroyed and what was recovered?

General STORY. That is in the engineer's office. The submarine defense was not turned over to us until 1901. These events occurred in 1898. The destruction of most of the mine material was during the Spanish war.

Mr. LITTAUER. General Story, I notice in the war deficiency act \$1,886,000 was appropriated for submarine mines. That must have been expended first for the purchase of cables and then for the purchase of an additional number of mines. What has become of that material.

General STORY. I can only tell you with reference to what was turned over to us. A good deal of that went for hire of boats and electrical parts.

Mr. LITTAUER. Then you had to depend upon civilian employees to lay the mines at that time?

General STORY. I really don't know how the thing was done. There

were not enough engineers to do it, I know; they had to depend upon civilians partially.

Mr. LITTAUER. You had no source that would warn you, in such a case as that, whether those mines were in an effective condition or not?

General STORY. From my conversations with engineer officers I have come to the conclusion that they were very unsatisfactory.

Mr. SMITH. Was not that largely due to the cables themselves rather than anything else?

General STORY. I really can not tell what it was due to. I think Major Goethals, of the general staff of engineer officers, could probably give you a better judgment of exactly what those mines were—how effective they were, than anyone else.

Mr. SMITH. Since the war this scheme of submarine defense has been established?

General STORY. Yes, sir.

Mr. SMITH. Let me see if I understand you. Did the Secretary of War, through the General Staff, call upon the torpedo board to estimate—

General STORY. I called upon the torpedo board after the responsibility was placed upon me.

Mr. SMITH. Then the Chief of Artillery called upon them after the responsibility was assumed?

General STORY. Which was on June 23, last.

Mr. SMITH. You asked the torpedo board for estimates?

General STORY. To complete the torpedo defense.

Mr. LITTAUER. For all material necessary to complete it. Then it is those estimates which we are now considering.

Please tell us how large an amount of the \$1,067,000 was expended for cables.

General STORY. They are very expensive. It do not know exactly how much has been expended for them or how much they cost, but they are very expensive.

Mr. LITTAUER. Do these cables have to be especially prepared for this work?

General STORY. There are no cables in fact in stock anywhere. Cables are only constructed to order.

Mr. LITTAUER. Are they different from ordinary commercial cables?

General STORY. Commercial cables are not kept in stock. They may have different kinds of wires, but they are constructed very much the same way.

Mr. LITTAUER. Once these cables are bought they deteriorate in storage. What part of them deteriorates?

General STORY. The rubber; and it is a very important thing to have the rubber examined by experts. This last year we were having some cable made and in getting it done we asked for an expert at the rate of \$50 a day. Almost the whole question was a question of rubber. But as they come more directly under General Greeley I would suggest that he explain that.

General GREELEY. The cables which were made in the Corps of Engineers during the Spanish war in 1898 had deteriorated to such an extent that I suppose it is within bounds to say that not 10 per cent of them are worth anything to-day. I was officially informed that there are 800 miles of cable at Willetts Point utterly worthless.



A year ago when the question of putting an installation in the Portland artillery district came up, it being utterly impossible for me to obtain in the brief time any make of cables made according to special corps specifications, owing to the industrial prosperity of the country, it was suggested to me that I might use these torpedo cables. I said that I was not willing to do that because I did not feel that they would work. The letter of recommendation was made to me by General Chaffee, the Chief of Staff, who said he would send a lot of them up there. I wrote back to him and said that I appreciated his desire to assist me, and that I hoped the cables would work; but that I had my doubts about it.

The cables were sent up there, and three out of four of them were absolutely worthless after they had been in the water twenty-four hours. Since that time every one of those cables has become worthless. In the Portland district, in one case there, there is a cable containing eight wires and ten miles long that has been laid there and is absolutely worthless, and worse than worthless; it has to be taken out. There was only one officer in the United States Army when the Spanish war broke out who could draw a specification for a cable, and that was Captain (now Colonel) Allen, of my corps. He only did it by accident because he had been in New York and was a very energetic officer, taking a great interest in his work and studying up on the question. He was able to say what was needed and what was good. At that time there was no torpedo department and there was no special training in it. And what General Story wants, and what I am sure we all want, is efficient and effective service.

General GREELY. In connection with these cables I want to say that some of them made in 1898 were gutta-percha, and those cables deteriorate very rapidly. If you do not keep them in water they are absolutely worthless in a month or two.

Mr. TAYLOR. What is the cause of the deterioration; what does it do?

General GREELY. If you allow gutta-percha to be subjected to a certain temperature, say, a summer temperature of 85 to 90 degrees, deformation takes place to begin with and then deterioration becomes chemical, affecting chemically the gutta-percha.

Mr. TAYLOR. Atmospheric?

General GREELY. Yes; that and chemically.

Mr. LITTAUER. There is no necessity for buying them, is there?

General GREELY. No. If you buy cheap rubber cables, made up with what we call "recovered" rubber, they may be all right for a month or for six months; but at the end of a year they are utterly worthless.

Mr. TAYLOR. What produces that?

General GREELY. Recovered rubber. If you could see that, the idea would strike you clearly. Recovered rubber is the shoddy of rubber.

Mr. TAYLOR. What makes its life so short?

General GREELY. The same reason that makes all shoddy life short.

Mr. TAYLOR. Atmospheric conditions and chemical conditions?

General GREELY. I am not an expert in the chemical part of it. I only know practically what has happened.

Mr. LITTAUER. You have described to us the torpedo cables. Are there not cables that could be made of such material that they could be preserved for years?

General GREELY. I was leading up to that. When a man goes into the market to buy a rubber cable, unless he is an expert, he gets the shoddy cable. A man who is the lowest bidder says that he will put in 40 per cent pure rubber, which is the proper proportion for an efficient cable. But he won't put in an ounce of it, but will use recovered rubber, or 20 per cent, in the compound. The rubber is the expensive thing. Rubber is worth now somewhere about \$1.40 per pound, and the price has been coming up steadily. You have got to have experts pass upon that subject. When General Story asked for one—I believe it was disapproved finally by the Secretary of War—the matter came to me, and I said that I did not have an officer that was capable of handling work of that kind, as unfortunately those that were capable could not be spared from the field work on the Alaskan cable.

General STORY. I want to say that an expert was recommended by a society in New York, an electrical society, but General Oliver, by reason of his intimate relations with the General Electric Company, was able to get a cheaper man from Schenectady, but anyone who was familiar with that matter thought that the price of \$50 a day for an expert was not too much.

General GREELY. So you see it is a question of performing a complex and difficult class of work, which must be done by an expert examiner to have it satisfactory. You take the very best rubber cable, and it will probably remain good three or four years, even out of water, if you put it where it is not subject to the sun. Now, I have a cable that has been out of the water for three years, and it is perfectly good; but as a general rule it is a dangerous thing to have. If you want to have your cables when you need them, they should be kept under water. To maintain any high degree of efficiency that is absolutely necessary. They can be put in tanks, where they can be covered with water.

Mr. LITTAUER. Do you not use cable tanks for the preservation of cables?

General STORY. We expect to.

Mr. LITTAUER. How many years ought a first-class manufactured cable to last if preserved in a tank?

General GREELY. That is a matter of opinion, and I could not say. Fifty years is put down as the general opinion of experts, but I should say twenty-five years if it is reasonably well cared for.

Mr. TAYLOR. You refer to the best quality?

General GREELY. Yes, sir.

Mr. SMITH. I would like to ask, regarding this money that has been appropriated from year to year for cables since the war with Spain, if these cables have been kept in tanks?

General STORY. Wherever we have them. We have not cable tanks everywhere; cable tanks are estimated for. We are having some built this year, and in preparing the specifications we have gotten the torpedo experts to assist us and the best electrical experts to assist us. It was for the inspection of these particular cables this year that we wanted the \$50 per day—

Mr. SMITH. What I was inquiring about was this: Are you going to invest money in these cables and let them rot?

General STORY. The estimate I have submitted for completing torpedo defenses provides for torpedo tanks also, but we have some now.

Mr. SMITH. Are you investing money you get in cables to deteriorate in tanks?

General STORY. We have a good many tanks. We only send cables where they have tanks or can be stored in water.

Mr. SMITH. What I wanted to know was whether the money now used in the cables was to be conserved.

General STORY. We are not keeping them anywhere in the open air.

Mr. LITTAUER. Without going over these items of expenditure, I understand that the total to complete a proper submarine defense will cost \$3,819,000.

General STORY. Yes, sir.

Mr. LITTAUER. Now, your estimates for this year call for an appropriation of \$700,000. How long would it take you, if war were declared at any given time, to provide this \$3,819,000 worth of material that would be necessary to complete the submarine defense?

General STORY. Now, at the time that estimate came from the torpedo board, I expected to send it to the Chief of Ordnance, but instead of that it went to the General Staff; and here is the memorandum with which I referred it:

This estimate is intended to complete the entire torpedo defense of the United States, and is based upon a detailed and expert examination of the needs of each harbor, provided with means of submarine defense, all of which have been carefully reviewed by the torpedo board and by the Chief of Artillery. It is estimated that the annual cost of maintenance of the complete equipment will be about 2½ per cent of the cost.

Much of the greater part of the material estimated for can not be purchased in the market, and from six months to a year is absolutely necessary for its construction and delivery after being ordered. The casemate apparatus is almost entirely of special design and is nowhere carried in stock. This electrical apparatus is a vital part of the system, standing in importance next after the cable and mines themselves. The telephones, automatic anchors, and many of the small parts required, such as hardware and tools, are of special construction. There are needed 735 mine cases to complete equipment; they are of special construction; only one firm in the country possesses the necessary special presses, tools, etc., to make them; none can be purchased in the market nor can any mine case be improvised that will give efficient service.

The greatest need, the one in which we are most deficient and the most costly, is for cable to operate the mines, nearly 900 miles being still required. Each firm having an order can only supply at the rate of 20 to 40 miles per month, depending on its plant. There are very few, probably only five or six, cable manufacturers in the United States, and these can not, as a rule, contract for immediate supply. Cable is never carried in stock and no amount of money can hasten its construction.

Many months will be required after the money is available to obtain the necessary explosive, of which over 500,000 pounds is needed. Dynamite, which was formerly used on account of the short time needed to supply it, is now surpassed in safety and efficiency by other explosives which do not deteriorate in store.

Without complete equipment always on hand, an efficient submarine defense can not be expected; without this equipment any number of skilled men and unlimited funds would be powerless to provide for the emergency which always exists, viz, the anticipation of war.

That is the item I prepared for the Chief of Ordnance.

Mr. TAYLOR. Is this suggestion since the original estimates were put in, this \$3,000,000 and more?

Mr. SMITH. This is for the current year.

Mr. LITTAUER. Describe to us what you intend to do during the current year with such appropriation as you have. You have an appropriation this year of \$187,000. What are you going to do with it?

General STORY. We will buy more cables, more small parts—the torpedo board recommends what they want done.

**Mr. LITTAUER.** If we had to lay down submarine mines to-day would you guarantee the safety of a single harbor in this first line of defense?

**General STORY.** No; the torpedo board states that there is not one complete.

**Mr. LITTAUER.** There is a difference between complete and being practically unprepared and having stuff on hand that is worthless.

**General STORY.** This is the report of the torpedo board. [Reads:]

The submarine mine equipment as now provided is by no means complete, and unless prompt and proper measures are taken to remedy these deficiencies this particular and important element of defense will be found wanting if it does not absolutely fail in the event of a sudden and unexpected outbreak of war.

**Mr. LITTAUER.** I want to ask you a further question on that new language inserted in the estimate on page 18. You ask that part of the appropriation for submarine mines be expended for the purchase of necessary machinery, tools, and implements for the repair shops of the torpedo depot at Fort Totten, N. Y. How much do you want for that?

**General STORY.** That I could not tell you.

**Mr. LITTAUER.** We surely would not want to include such an unlimited—at least we would not want to permit the entire appropriation to be devoted to such a purpose.

**General STORY.** All these expenditures have to come through me. There would not be a cent of money expended for any of that without my approval. It has to pass my supervision and also the Chief of Ordnance.

**Mr. LITTAUER.** Last year you put this into a separate paragraph, and I suppose you made a request for something in the neighborhood of \$300,000 for such tools. If left in the condition it is now, neither appropriation could be devoted to that. Can you not furnish us about the amount of money that you would want for this purpose?

**General STORY.** I may within a few days, as soon as I could communicate with Major Murray.

**Mr. LITTAUER.** Is it necessary?

**General STORY.** Unquestionably necessary.

**Mr. LITTAUER.** You are just now not needing so much original installation as you are repairs?

**General STORY.** The material for defense comes from the depot to the different posts, and you might call it the general base of supply. If anything can not be repaired at Chesapeake Bay or Charleston, it will be sent there for repairs; of course we can not give a fixed estimate of that, but we can come somewhere near it. Unquestionably my interest is not to spend that money in repairs, but in original installation.

**Mr. LITTAUER.** Our method of appropriation is always to determine with approximate exactness how much money should be spent for such material.

**Mr. SMITH.** I want to say that I suggested last year—and I think there is great danger that I will turn out to be right—that this inclusion of extra pay, which was inserted last year as new matter, will make this appropriation lapse and not be continued. The Constitution expressly prohibits any appropriation for the support of the Army for more than two years. In my judgment, this language was very unfortunate and will probably result in these appropriations all lapsing at the end of two years. It has been put in here at the request

of the Department, but my judgment is that it is bound to result in disaster.

Mr. LITTAUER. These provisions have been in the appropriation bills for years.

Mr. SMITH. We put that in last year.

Mr. LITTAUER. Every appropriation in this bill is available until expended.

General STORY. I am inclined to think that, so far as these appropriations go, practically all has been spent from year to year.

Mr. SMITH. If you spend it, you do not let anything lapse; but my judgment is that it is highly dangerous to put into any item of this bill an appropriation for pay, because the Constitution expressly provides that no appropriation shall be valid for the support of the Army for more than two years, and if we put in any appropriation bill a provision for the payment of the Army, in my judgment the amount of the appropriation lapses at the end of two years.

General STORY. Then you must, as far as extra-duty pay is concerned, limit that to one year?

Mr. SMITH. The entire section, in my judgment, of extra-duty pay ought to be stricken out, lest it carry the whole section down with it.

General STORY. The men who are under the law doing the work are entitled to the pay.

Mr. SMITH. I am not trying to deprive them of their pay. I simply want to offer that suggestion, because I think that under the Constitution it destroys the appropriation at the end of two years.

Mr. BRUNDIDGE. Did I understand you correctly when I understood you to say that the greater part of the submarine mines planted during the Spanish war were destroyed by exploding them, and were a total loss?

General STORY. The mine cases. Such is my understanding.

Mr. BRUNDIDGE. Was there nothing about them that could be removed and made a saving to the Government? Was the fault in laying them, or what was the matter?

General STORY. There were several fatal accidents that occurred in trying to recover them, and after that I heard the mines were exploded. I simply know this thing, as you may have known it, from hearing people talking about it or from seeing it in the papers. It was never brought to my attention officially, nor have I official information.

Mr. LITTAUER. At that time your department had nothing to do with mines?

General STORY. It is only since 1901 that the mine defense was taken over by the artillery.

Mr. LITTAUER. It was necessary to explode some of them, and it got beyond their control because of the inefficiency with which they were laid down.

General STORY. Some had been run over by vessels and some had been torn from their moorings. In Boston Harbor a soldier was killed; and there were other places where men were killed.

Captain MILLAR. In the mouth of the St. Johns River, in Florida, an engineer officer and several men were severely injured.

Mr. BRUNDIDGE. They can be placed so as to be removed with safety?

General STORY. That is what we propose to do.

Mr. LITTAUER. You believe that you can perform that work so that you can take up mines in any given harbor without loss?

General STORY. I have no doubt about that. Bring about the change of system or method.

Mr. LITTAUER. What brings about that change of system or method?

General STORY. In the first place, when mines are laid they should only be laid by persons who have been trained in the work. During the Spanish war they were laid by almost anybody that they could get to do it.

Mr. TAYLOR. Now you have trained men?

General STORY. But we have very few of them. I asked only yesterday for orders to send boats that we call torpedo planters to all the posts along the southern coast. We wish to have men in each harbor trained in the laying of mines, but I do not believe we will have the personnel to spare for it.

Mr. LITTAUER. Let us take up the other branch now. Your force has control of the handling of our coast fortifications, once in place?

General STORY. Yes, sir.

Mr. LITTAUER. Now, the matter of range finding and fire control is one that you are very intimate with. A new system you told us last year had been tested.

General STORY. At Pensacola, and approved by the Secretary of War.

Mr. LITTAUER. We made last year certain appropriations, first for the installation, for the apparatus including your various stations, and for the instruments. Now, how was that money expended? How many of these new systems of fire control have you been able to apply, and in what condition in general is this new system?

General STORY. We have not been able really to complete the whole system anywhere. In answer to your question as to where the money is expended, I will say the engineer's department, the signal department, and the Ordnance Department keep the accounts.

Mr. LITTAUER. Let us understand clearly. A model or experimentally complete fire-control system was placed at Pensacola. It was constructed out of temporary material, or such material as you want to place at each fortification. But, nevertheless, the entire system was there laid down and tested and approved by all the high authorities of the War Department.

General STORY. That is correct.

Mr. LITTAUER. Is that the only complete installation in the United States?

General STORY. That is the only complete installation in the United States.

Mr. LITTAUER. Well, how thorough was that test? Was it a thorough enough test to warrant us in expending a million dollars for the completion of such a system at every emplacement?

General STORY. In the first place I think it lasted all of a year—in preliminary tests—then it was tested thoroughly for five or six days before the Board of Ordnance and Fortification, and the test was carried to a very successful conclusion. Within the last two weeks we have had a fine test at Fort Monroe of the system, which is not yet completely installed there. In this test the fire-control system was used and one officer—a fire commander—directed the fire of the several batteries. In firing from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  miles, out of eight 12-inch shots we got six hits, or 75 per cent. Out of twelve 10-inch shots we got

twelve hits, or 100 per cent. And with  $4\frac{1}{8}$ -inch rapid-fire guns we got 90 per cent of hits.

Mr. LITTAUER. Is that at a range that this system is not particularly needed for?

General STORY. Without that system we would not have obtained 20 per cent at the ranges employed.

Mr. LITTAUER. In other words, it makes firing at the short range, the 2-mile range, much more positive than formerly. Have you had a thorough test on the long ranges, 4 to 6 miles?

General STORY. Oh, yes; range finding is the only means that would give us accurate firing at ranges of more than  $2\frac{1}{2}$  miles. We fire mortars at targets distant 4, 5, and 6 miles. Of course, you know that a ship at 3 miles is a very small target; you all know how difficult it is to estimate accurately the distance to a vessel 3 or 4 miles away.

Mr. LITTAUER. With the old system there was no surety, and it was almost a waste of ammunition to shoot beyond  $1\frac{1}{2}$  miles.

General STORY. Yes, sir.

Mr. LITTAUER. What has been the result of the distances beyond that?

General STORY. We have had wonderfully accurate shooting.

Mr. LITTAUER. How much testing have you had?

General STORY. We have tested every year. One-third of our ammunition is fired at what we call the short range. Then we have what we call mid range, from 5,000 to 8,000 yards, and then we have the long range, which is from 6,000 to 9,000 yards.

Mr. LITTAUER. What is the proportion of effectiveness between your short, your mid range, and your long range?

General STORY. Of course there is a falling off, but firing at mid range at Fort Monroe we had over 50 per cent of hits. We get better results at short range than we do at other ranges, still there is a natural falling off, because there is error in every gun. Our range-finding system is more accurate than the guns. Then there is another advantage. With this range-finding system it enables us to fire at a moving target very much better than we can otherwise.

Mr. SMITH. When you say that you could not hit anything with any degree of accuracy over two and one-half miles off, couldn't rely on any percentage of hits, was that before the use of the range finder?

General STORY. Before the range finder. Then we only trusted the eye.

Mr. SMITH. What has been the change since the addition of the range finder relative to what it was before this system of fire control was tried at Pensacola? Has there been any great increase of effectiveness?

General STORY. We simply had the same system all along the coast improvised for single batteries. We had no method by which we could unite the action of one battery with that of another so that one officer could direct the fire of four batteries.

Mr. LITTAUER. I hardly think that meets the point. You intimated that the eye or some depression range finder was generally adopted before this Pensacola scheme was proved out. Now, before the Pensacola scheme was proved, how were the range finders then?

General STORY. Not as accurate.

Mr. LITTAUER. In what proportion?

General STORY. I can explain to you why they were not as accurate. A depression range finder has usually a vertical basis of about 60 feet. That base changes, depending upon the tide above 60 feet or below, so that at every change of tide it becomes inaccurate, unless corrections are made for the rise or fall of tide. Then there is also a refraction of the atmosphere, which also affects the accuracy of the depression range finder.

Mr. TAYLOR. What is the percentage of improvement?

Mr. SMITH. Your estimate was \$2,200 a gun last year on the installation at Pensacola.

Mr. LITTAUER. The testimony that we had last year in the note that came with the bill was that each installation or horizontal fire-control system would cost \$2,113. Then we had some other testimony that made us believe that the cost would range up as high as \$4,200. Now this year you come to us with new figures based upon \$1,709. Now the question is, are these three different estimates—\$4,000, \$2,000, and \$1,700—based upon the same items, or are there items left out of one and put in another?

General STORY. They would differ.

General GREELY. May I interject a reply there to throw some light on the subject? The cost of installation varies from \$500 to \$10,000 for a single emplacement, according to the situation and conditions.

General STORY. I have here an interesting table this year for the first time. I have asked to have a board of officers visit every fortified harbor in the United States to select the stations for horizontal position-finding systems, and a number of their reports have come in, and I have in my hands the estimates of the engineers and of the signal departments.

Mr. LITTAUER. Bear in mind how we must look at this matter. In the first place there is but one experimental establishment now existing, and a variation of testimony that an installation will cost anywhere from \$500 to \$10,000. There are 1,297 emplacements, or 1,297 installations, now needed. The sum of money needed to cover this improvement is so vast that it is difficult for us to understand how to proceed.

General STORY. Mr. Littauer, if you will look at that statement—you see those money estimates—I have nothing to do with their preparation; I never see them until they are finished by the engineer or signal departments.

Mr. LITTAUER. Well, let that branch of the subject go and deal entirely with the general efficacy of this system.

General STORY. Of this 1,297 emplacements that you are speaking of nearly one-half will not have a fire control.

Mr. LITTAUER. There will be 600 systems of fire control.

General STORY. I am trying to get the estimate for every single harbor.

Mr. SMITH. General, I think you have overlooked in your answer the point that I was trying to make. What I wanted to get at, if possible, was the increase in efficiency from the vertical to the horizontal system.

General STORY. We can not give it to you in percentages. There is no means by which we can tell it. I have explained to you that a base line of a mile or two miles must give a great deal more accuracy than



a base that is continually changing. A vertical base line is changing every moment because of the tide, its distance above the water level changing every minute. Another great objection to the depression range finder, and one which applies to the whole Atlantic coast with a few exceptions, is that these instruments are in high towers, and the first object of an enemy would be not to fire at our guns but to knock out our towers.

Mr. TAYLOR. How many hits did you have before you had the range finder sufficiently developed. What percentage of hits then and what percentage of hits now?

General STORY. It has been improving all the time.

Mr. LITTAUER. You would be more likely with this fire-control system to hit a ship 5 or 6 miles out.

General STORY. In the Santiago firing there were about 3 or 4 per cent of hits of all the shots fired. I don't think the Navy fired more than 2 or 3 miles distant, and generally at much less ranges.

Mr. LITTAUER. Can you, with this Pensacola system fully installed, feel warranted in saying that 10 per cent of shots fired at an object 5 or 6 miles out would reach the target?

General STORY. We expect more than that.

Mr. TAYLOR. Would you say 25 per cent?

General STORY. Not now.

Mr. BRUNDIDGE. The last session of Congress appropriated for this fire control \$500,000. How much of that money has been expended?

General STORY. We do not have the figures; those figures do not come to me at all. For instance, I will recommend that a thing be put in a certain place, and the Chief of the Signal Corps and the Chief of Engineers will expend it where I wish. I don't know whether it costs \$10 or \$25 or what.

Mr. BRUNDIDGE. What I want to get at is this. With an appropriation of \$500,000, I have been unable to understand why some of those have not been completed.

General STORY. It is because it is a great deal more important to make the individual batteries efficient before we go into the matter of extension to the fort as a whole.

Mr. LITTAUER. General Story, will you permit General Greely to give his testimony. I think it will help us out. General Greely, will you take the chair.

Your connection with the fire-control installation is altogether in providing the means of communication between the various bases in this horizontal system. We gave you last year an appropriation of \$500,000. What have you done with it?

General GREELY. I have spent, I suppose, in round numbers, about \$100,000 of it.

Mr. LITTAUER. For what purpose? Why have you not spent more?

General GREELY. Because the chief of artillery, pursuing what I think is a sound principle, decided that there should be no more money thrown away on installations which were thought to be inefficient; so he requested me to stop expenditures on original installations until an artillery board should have visited each one of those posts and determined the type of installation at that post. Those reports have come in from time to time, and whenever they have come in General Story has passed upon them with the advices of his officers, and they have

been referred to me, and to the Chief of Ordnance, and to the Chief of Engineers for remarks as to whether we object to any recommendation therein, or have any recommendation to make as to their improvement. And whenever reports have come in they have been referred to me by the Chief of Artillery, after he has approved them finally, for details of plans and estimates. I have furnished such plans and estimates to the amount of, I should say, probably exceeding a million dollars.

General STORY. It is slightly less.

General GREELY. Then it is a million dollars in round numbers. Of course quite a number of these reports which I have not passed upon are some of the most expensive installations in the country; that at San Francisco costing probably—I have estimated that, of course, not knowing what the report would be—\$275,000. The Columbia River is perhaps \$100,000. Those, of course, are estimates. These others are based upon actual data of the price of instruments as they have been purchased in the past; and on the cost of installation under similar conditions. They are not what you would call rough estimates, but they are what you would call a definite estimate, such an estimate as a builder would make you if he wanted to get your work. They are practical estimates and not guesswork.

General STORY. You have the exact location of every station.

Mr. LITTAUER. Before we can get a comprehensive idea of what this installation amounts to, I would like to go over the items of it. Do you begin the installation, or do the engineers begin to dig ducts and erect houses?

General GREELY. In the first place, this whole scheme of coast defense is under the Board of Ordnance and Fortification, of which I am not a member—the Secretary of War, General Story, and I believe a civilian member, and General Crozier. They approve of certain general schemes; then the Chief of Engineers takes the matter up, and he goes to work and builds them in accordance with the approved general plan, depending of course on the environment. When these emplacements are constructed, then the Chief of Ordnance comes along and puts in his guns. When that is done, then I come along and put in the system of electrical intercommunication, just the same as in a house that you would build first, when you would have to do a certain kind of interior work, wiring it up and so on.

Mr. LITTAUER. You have to put up outhouses first before you begin?

General GREELY. I have, practically, nothing of that sort, so far as I am concerned.

General STORY. Mr. Littauer means the plotting rooms; that is part of the fortifications.

Mr. LITTAUER. Part of the emplacement.

General STORY. Yes, the batteries; I may say the batteries rather than emplacement, because there may be one or more emplacements belonging to a battery, connected with the power house and the plotting room and so forth.

Mr. LITTAUER. I had an idea, however, that if we gave you a certain amount of money for your electrical communication, and didn't give an appropriation of a proportionate amount of money to the engineers to do their share of the work, and the ordnance department also, that you might go ahead and have a lot of work done that could not be used.

General GREELY. That is the risk. I came this year and announced the fact that there are 1,162 emplacements finished with no system of fire control in them.

General STORY. I would like to interrupt you. I have been wanting to have the fire-control system very largely extended in Chesapeake Bay by reason of the proposed maneuvers next year. You have been unable to spend money you have for that purpose because the engineers can not build their part for want of funds.

General GREELY. They have completed the emplacements, but they have not completed their batteries and conning towers, and all that sort of thing, and their ducts.

Mr. LITTAUER. Is that a part of an ordinary emplacement?

General GREELY. Of an ordinary battery, yes.

Mr. LITTAUER. Then those batteries are not yet completed as far as the engineering work goes?

General GREELY. The emplacements are completed, but the batteries or the groups of batteries are not completed; that is, with all the interrelated buildings and things which are absolutely necessary to make them efficient.

Mr. SMITH. The engineers put in the conduits.

General GREELY. Yes. This is the first effort that has been made to coordinate this service. I agree with General Story that we should find out what we want first instead of wasting money by an inefficient service.

General STORY. When I became chief I found in every harbor of the United States local boards had recommended systems of fire control. Some of them were perfectly absurd, some extravagant, and there was no uniformity of method. So I asked for a board to visit the harbors and fix systems of position finding in the hope that they would be able to tell exactly what we will need. I did ask General Greely to stop work on fire-control installations until I had reports that I could rely upon.

General GREELY. There was in process of completion under this new system the Chesapeake district, the Potomac district, the Baltimore, and the district of northern New York.

Mr. LITTAUER. Do you believe, then, at the end of next year, with a fair appropriation, you will have been able to build a half dozen or dozen or twenty installations?

General GREELY. I can not answer that question, for I don't know what the Corps of Engineers will do.

Mr. LITTAUER. Are the Corps of Engineers without enough money to build this work?

General GREELY. Yes. I have notifications in regard to probably six or eight projects in which they notified me that they have not the money to go on.

Mr. LITTAUER. Under what heading do we appropriate the money that the engineer would use for installation of range and position finders?

General STORY. That must be the heading.

General GREELY. I only know my part of the work.

Mr. SMITH. Has it not been the policy to get the work in progress in many places rather than complete it in one place?

General GREELY. Undoubtedly it has been.

Mr. LITTAUER. I see that your estimate for only ten harbors would call for engineering appropriations for this work of a million dollars, approximately; but still last year the engineers came to us with an estimate of \$250,000. We gave them 90 per cent of their estimate—\$235,000—and you now state that they were unable to get their work in such shape that you could lay down a single—

General STORY. You did not give them money enough to coordinate their work with the signal work.

Mr. LITTAUER. Our answer is that we were not asked for it. It would seem from this that the sensible way to make these appropriations would be to make them in a lump sum, to be divided up by the Secretary of War as he thought necessary between the various services who may carry out the work.

General GREELY. Who is responsible for efficiency? The Secretary of War, who is now an overburdened man? When you get me up here you can find out what I have been doing, and I can be held responsible for the economy and efficiency of my work. When you have a bureau chief here you can bind him down.

Mr. LITTAUER. Who is to give us a proper understanding of the amount needed in order that we can appropriate intelligently and provide a proper amount for each one of the bureaus?

General GREELY. The Secretary this year asked each bureau chief to inform him how much had been appropriated and how much was necessary to complete this work. I think that is the first time it has ever been done.

Mr. SMITH. Half-finished work of this kind is of but little value.

General STORY. Yes.

Mr. SMITH. Wouldn't it be much better to have certain batteries complete than to have a great many in course of construction?

General GREELY. That was recommended by General Corbin in his report this year and indorsed by the Secretary of War. I believe there is going to be a new deal in this matter. I believe the Secretary will cooperate with General Story on that matter. It is the first time that there has been any successive and systematic effort made to coordinate this work to find out what is best and how it should be done.

Mr. LITTAUER. Now, let us get back to something that sticks in our minds.

Why, with what we give the engineers, was there not two or three of these systems completed as far as their work goes, so that you could complete your work with what surplus of money you had, thus finally completing the system in three or four different places?

General GREELY. You will have to ask the Chief of Engineers about that. I am in the unfortunate position that I can not do anything at all. I am the end of this business if anybody is late.

Mr. LITTAUER. Can you answer that, General Story?

General STORY. Mr. Littauer, there was \$235,000 last year in the engineer appropriation. They have expended that money mostly at Forts Hamilton, Wadsworth, Totten, Schuyler—very little more to be done there.

Mr. LITTAUER. If that is the case, it is near completion?

General STORY. Yes.

Mr. LITTAUER. Then it will be General Greely's turn to complete his end of the work.

General GREELY. I am waiting on two of these places that he speaks of. The Chief of Engineers says that he has not got his money to work with.

General STORY. I might add about those four posts that I have done everything that I can do there.

Mr. LITTAUER. I want to go, then, to another branch of the subject—the cost of this system.

General GREELY. It will vary at each battery, according to the lay of the land and various necessities.

Mr. LITTAUER. I notice in the report of the Board of Ordnance and Fortifications that they are examining a lot of different horizontal base patents. What does that mean?

General STORY. That means we are very anxious to get what is called a self-contained horizontal base instrument.

Mr. LITTAUER. Will that cheapen the cost?

General STORY. If we can get such a thing it will cheapen the cost, otherwise we would not have been investigating it. We think it is important now to make our range finding as accurate as possible, and if we can find such an instrument, and it answers the purpose, we will accept it; but we have not seen anything yet. One or more of these instruments have probably been tested annually for the last ten years. I want such a successful instrument even more than this committee does. Mr. Chairman, from this estimate it is probable that to completely equip the United States for fire control will not cost much in excess of \$3,000,000.

General GREELY. In addition to the \$3,000,000, it will cost \$400,000 for the Signal Corps.

General STORY. You have nearly everything down now, and it is just a million.

General GREELY. That depends whether certain things are omitted or not.

Mr. LITTAUER. Teleautographs.

General STORY. I have thrown out the expenditure for teleautographs. I mean on the primary or base lines.

General GREELY. The Board of Ordnance and Fortifications has approved of a scheme that requires those at certain places.

General STORY. The teleautograph and the wire connections are so expensive that I am in hopes that some new instrument which will cost less will supplant it. While I am anxious to have the service efficient, I am equally anxious to have it economical.

Mr. LITTAUER. General, you stated a moment ago that a little over \$3,000,000 would cover the installation of these horizontal bases.

General STORY. Exceeding that slightly I now think. I want to say that by the Secretary of War's report this year it seems that the fortifications have cost about one hundred and nine millions of dollars, if my memory is correct. If we were to double every gun we have in the United States, it would not add as much to the efficiency of defense as completing this position-finding system.

Mr. LITTAUER. The testimony seems to show, General, that the range-finding system will more than double the efficiency of the guns now in place.

General STORY. The fortification has cost over one hundred million dollars. You see what General Greely has estimated for to help out at some of these harbors, and I think you can see what our method is.

General GREELY. The Pacific coast will cost somewhere about \$700,000.

Mr. MARSH. From what has been stated here to-day it seems that this whole service ought to be coordinated, and by the coordination that you are endeavoring to bring about. Who directs and controls the coordination? Is there one central head?

General STORY. So far as I can discover from the legislation it has been a go-as-you-please coordination; nobody has done it. The Secretary of War should do it.

Mr. MARSH. I want to follow that up. There could be such a coordination that when you gentlemen come up before this committee Mr. Greely will be able to estimate just what he needs and the Engineer Corps just what it needs.

General STORY. That is true.

Mr. MARSH. And the Ordnance Corps just what it needs. And then this committee could intelligently appropriate for each of these respective services, so that when one is expended the next can be expended, and the finishing touches that General Greely puts on may be completed without a surplus or a deficiency.

General STORY. You are right about that.

Mr. MARSH. How can that coordination be brought about?

General STORY. The Secretary of War.

Mr. MARSH. The power rests in the Secretary of War to bring that about?

General GREELY. No one else.

Mr. MARSH. Then the Secretary of War should direct, in your opinion, the heads of these different bureaus to work in harmony, to the end that coordination may be secured.

General STORY. There is no doubt about that.

Mr. SMITH. Could not the engineer officers, without any instructions from the Secretary of War, in place of scattering this money all over the different places in the United States concentrate it on one?

General STORY. That is true; but I would have been unwilling to do that. When I became chief of artillery there were 26 companies which had no means for position finding.

Mr. LITTAUER. So you applied some partial method.

General STORY. I wanted every company to have a fair chance for such instruction. I am unwilling to equip Fort Monroe and leave some fort without any means of firing whatever.

Mr. SMITH. Why don't you concentrate on one and give us an object lesson on one?

General STORY. We have nearly done it at Fort Monroe. If you have an extra session, I want you to go down there and see the system in actual operation.

General GREELY. It is done at Fort Totten, and in progress at Fort Monroe and Potomac.

Mr. LITTAUER. Nearly enough completed to be of effective use?

General STORY. Yes, sir. You could see how much is needed.

General GREELY. You can see how far I pushed the coordination. I brought up the matter with General Story as soon as he came to the head of the Corps, and I said that there would be no money spent by me on my individual motion, and he agreed that the best thing to do was to see that every original installation should be approved by him, and our recommendation approved by the Secretary of War. Every

requisition goes through General Story, and is never touched by me until he approves it. I take up the work at the posts in the order that he desires it, and I submit a working scheme to him for his approval before anything is done. Everything is drawn to a scale just the same as you would if you put up a building.

Mr. LITTAUER. The necessity of the service here is very apparent, especially where they have no control at all; and it is the necessity of Congress that some of these new fire-control systems be completed if you want appropriations from us.

General GREELY. There will be by April. Totten, New York Harbor, Fort Monroe, Fort Washington, and all conditions around Baltimore will all be in working order by March or April.

Mr. SMITH. We were making inquiries last year, wanting to know whether this was completed anywhere. We got the impression that certainly some of them would be completed by this Congress.

General STORY. What if I had recommended that all of this money be expended in completing this work at certain forts? Such action would have left some batteries without any means of instruction.

Mr. SMITH. We realize that, but on the other hand we would like to know that some of them were finished.

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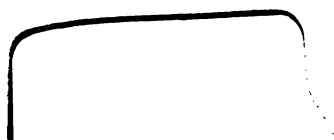
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